

Specification of Requirements for Aeromechanical Testing of Small Compressor

Introduction and Requirements:

Gas Turbine Research Establishment (GTRE) intends to perform the Manufacturing and Testing of Small Compressor on turnkey basis. The compressor parts have been designed by GTRE and all necessary manufacturing drawings of the test compressor will be provided by GTRE. The broad specifications of the Compressor are as mentioned in Table 1.

Table 1: Major specifications of the Small Compressor

| Parameters | Value |
|--------------------|--|
| Power Requirements | ~ 800 kW to 1.6 MW |
| Speed | ~ 10000 Rev/min to 43000 Rev/min |
| Mass-flow | ~1 to 7 kg/s |
| Max torque | ~500 N-m (in the speed & power range) |
| Inlet diameter | ~ 220 to 240 mm |
| Max Axial length | ~ 200 to 220 mm |
| Material | Titanium (or) steel, if meets the test requirement |

The main objective for this project is to define/validate aerodynamic design and performance for this compressor. The test program includes characteristics at constant speeds, surge margin detection; accelerations/decelerations with constant throttle setting and to evaluate the impact of inlet distortion.

Manufacturing & Aeromechanical Testing of Compressor:

The manufacturing and aeromechanical testing of compressor module would involve the following major aspects:

- Manufacturing of compressor as per the drawings issued by GTRE
- Design and development of all rig adaptation hardware

- Validation of axial compressor performance at design and off-design conditions.
- Generation of Compressor characteristics map at design and off-design speed.
- Evaluation of impact of inlet distortion on performance and operability.
- Acquisition of information on vibratory stresses of blades and casings.

Aeromechanical Testing of Axial Compressor:

Aeromechanical testing of 4 stage axial compressor at International Standard Atmosphere (ISA) – Sea Level Static (SLS) from 30 % speed to 105 % speed at an interval of 10 %. Probable duration of tests will be around 50 to 60 hours.

Hardware Manufacturing:

Manufacturing of rotors (blisks) and Stator Casings as per the design drawings supplied to the successful bidder. Responsible for the design and manufacturing of the Test Rig related adaptations for inlet and exhaust of test vehicle, support structure for compressor test bed mounting, instrumentation of test hardware as per ASME PTC 10 or equivalent and distortion screen manufacturing for the High Speed Compressor Test.

Other services:

- a. Mechanical services related to preparatory activities for testing axial flow compressor. Manufacturing of interface parts for integrating test rig with the test facility.
- b. Shall carry out mechanical design and analysis of critical test facility interface components for stress, vibration and rotor dynamics.
- c. Shall procure/arrange the necessary consumables required for the test. These consumables to be defined after order placement and mutually agreed between GTRE and Bidder.
- d. Shall carry out the necessary instrumentation for axial flow compressor rig health parameters like casing and bearing vibration, lubricating oil temperature and pressure at supply & drain and speed pick up for the Compressor test section. The data acquisition system shall have provision of 256 pressure & 128 temperature measurement channels dedicated for Compressor test section only.

- e. Shall provide the algorithm of the experimental data processing in the technical report.
- f. Shall acquire the performance data during the test and shall provide the data in a compatible format acceptable to GTRE.
- g. Shall prepare a technical report against each milestone as per requirements by GTRE.

Detailed test plan and test procedure will be provided by GTRE in form of Test Requirement Document (TRD) after signing of contract.

Expression of Interest (Eoi):

GTRE seeks expression of interest (Eoi) from the Indian government organisations / private entities for Aeromechanical Testing of Small Compressor. Interested parties should have the necessary capabilities to carry out the test as per the specification provided in SI No: 3.

The prospective supplier should not have any restrictions, by way of other agreements with any other company, to submit Eoi response or enter into agreement for participating in the aeromechanical tests of compressors.

Capabilities of Prospective Partner:

In order to assess the capabilities/competencies/financial stature etc. details are required to be furnished as per Annexure-B. While providing details, include and specify Prospective Partner/s / its group companies/parent company/subsidiaries/JVs information separately.

Eligibility Criteria for participating in this Eoi:

Financial:

1. The prospective partner/s should have the requisite financial strength for supporting projects of this scale. The partners are requested to furnish relevant information as mentioned in Annexure-B.
2. If the prospective partner/s are required to rely on the financial strength of its/their Holding company, the details of the Holding company may be furnished. Documents indicating the Holding structure and nature of assurance / comfort that would be made available to the prospective partners to be indicated.

Technical:

3. Partner/s should have experience and demonstrated technical capabilities in the field of aeromechanical testing of small compressor in the past through successfully closed supply orders during the last five financial years.
4. Prospective Partner/s are requested to indicate the technical capabilities of its/their own. If the prospective partner/s are required to rely on the technical capabilities of its/their Holding company, the details/documents indicating the technical capabilities, infrastructure available for the Projects etc., of the Holding Company to be indicated.

Submission of responses to the EoI:

The Applicant Company shall submit the EoI response to the e-mail mmgbm.gtre@gov.in or in an envelope with marking as "**EoI for participation in the 'Aeromechanical Testing of Small Compressor'**" along with Covering letter enclosed as Annexure-C. The Envelop should clearly indicate the name and address of the Applicant Company. In addition, the last date for submission of the EoI response should be indicated on the right hand top corner of the envelopes. The EoI response shall be typed in the English language and signed by the authorized signatory of the Applicant Company who shall also initial each page. GTRE may seek further information/clarifications on the EoI response in case required.

Interaction with Applicant companies:

- i) The applicant companies shall send their queries to the EoI issuing Office i.e. GTRE, **with the EOI name as subject** to email: mmgbm.gtre@gov.in and kaurbaljeet.gtre@gov.in three days before the closing day of the EOI
- ii) The queries should necessarily be submitted in the following format:

| S.No. | EoI Reference(s) (Section, Page No.) | Content of EoI requiring clarification(s) | Point(s) of clarification (s) |
|-------|---|--|----------------------------------|
| 1. | | | |
| 2. | | | |

8. Delivery Address:

The EoI response should be delivered at the following address:-

The Director,
Gas Turbine Research Establishment,
P.B.No: 9302, DRDO, Ministry of Defence,
C V Raman Nagar, Bengaluru, Karnataka – 560 093, India
Contact No.: 080-22320845 / 080-22320247 / 080-22320336
Email: mmgmbm@gtre.drdo.in

9. Due date for Response:

Submission of Bid Date – 28 Jun 2024 at 10.00 AM

10. Further course of action:

The responses to the EoI will be evaluated by GTRE to assess the capabilities of the respondents and to formulate the terms and conditions for issuance of RFP. Only eligible respondents will be invited for further technical evaluation process and subsequent for participation during the RFP.

11. Disclaimer:

i) The purpose of this EoI document is to provide the prospective Partner/s with information to assist the formulation of their proposal. This EoI document does not purport to contain all the information each prospective Partner may require. It is not possible for GTRE to consider the business/investment objectives, financial situation and particular needs of each prospective Partner. Each prospective Partner should conduct their own due diligence and wherever necessary, obtain independent advice from appropriate sources.

ii) GTRE, 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 EoI document.

iii) GTRE may, in its absolute discretion, but without being under any obligation to do so, modify, amend or supplement the information in this EoI document prior to the last date of submission of responses while giving sufficient time to potential respondents to modify their responses as may be needed. GTRE reserves the right to cancel this EoI and/or invite afresh with or without assigning any reason.

iv) The issue of this EoI does not imply that GTRE is bound to select and shortlist any or all the prospective supplier. Further, GTRE is not bound to take any further action in the matter.

v) The prospective supplier shall bear all costs associated with the EoI, including for preparation, technical discussion/presentation and submission of response against this EoI and the discussions, presentations and clarification that might follow. GTRE shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the EoI process.

vi) Canvassing in any form by the prospective supplier or by any other agency on their behalf shall lead to disqualification of their Eol response.

vii) None of the intended supplier's representatives shall have any claims/ liabilities whatsoever against GTRE or any of their officials, agents, or employees arising out of, or relating to this Eol.

viii) The Eol process shall be governed by and construed in accordance with the laws of India, which are in force from time-to-time and the courts at Bangalore shall have exclusive jurisdiction over disputes if any arising under, pursuant to and/ or in connection with the Eol process.

Expression of Interest (Eoi) for “Aeromechanical Testing of Small Compressor”

EOI Ref No: GTRE/COMP/SCT/02/2023-24

Information to be submitted by the applicant Company

1. Name of the Applicant Company:-
2. Address of the Registered Office:-
3. Number of Offices with addresses (Excluding Registered Office):-
 - a) India:
 - b) Abroad (Please mention the nature of Business):
5. GSTN:-
6. PAN:-
7. Contact Details:-
 - a) Name of the Contact Person:
 - b) Designation:
 - c) Postal Address:
 - d) Telephone / Mob. no.:
 - e) Fax no.:
 - f) E-mail address:
8. Aerospace specific Technical capabilities:-(Attach complete facility details)
9. Financial details:-
 - a) Ownership details / breakup:
 - b) Present business portfolio:
 - c) Annual Turnover for last 3 years (in Rupees Crores.):
 - d) Profit / loss for last 3 years (in Rupees Crores.):
10. List/details of participation in Aerospace projects (Indian/Export):- (Attach details)
11. Whether the respondent has been blacklisted by Gol or any other Govt. Entity:-
(Details, if Yes)
12. List/details of technical collaboration/MoUs with other OEMs/Companies:-(Attach details)
13. Any other relevant information:-
14. Declaration:-

It is certified that the above information is true to the best of my knowledge

(Authorized Signatory) Seal of the Company

Appendices to the proposal:

1. **Appendix A:** Brief technical proposal covering aeromechanical testing of small compressoras technical proposal
2. **Appendix B :** Time-schedule for execution and rough order of magnitude (ROM) cost with major breakup
3. **Appendix C :** Test facility description and design expertise of the firm for such facilities and the list of similar projects executed by the firm within India and world-wide
4. **Appendix D:** Project management team with contact information along with project management structure
5. **Appendix E :** Required infrastructure, support services and technical scope of work by GTRE towards the aeromechanical testing of small compressor

Covering Letter

To,

Subject: Expression of Interest (Eoi) for “Aeromechanical Testing of Small Compressor”

With reference to your EOI document no _____ dated _____, we have examined the EOI document and understood its contents and hereby submit our Application for the aforesaid:

1. We acknowledge that GTRE will be relying on the information provided in the Application. We certify that all information provided in the Application and the Annexure-B are true and correct; nothing has been omitted which renders such information misleading and all documents accompanying such Application are true copies of their respective originals.
2. We confirm to make available to GTRE, within the stipulated time, any additional information/ Documents it may find necessary or require to supplement or authenticate information provided.

In witness thereof, I/we submit this application under and in accordance with the terms of the EOI document.

Yours faithfully,

**(Signature, name and designation of the Authorized Signatory
Name and Seal of the Applicant)**

