DHI CENTRE OF EXCELLENCE IN ADVANCED MANUFACTURING TECHNOLOGY
IIT KHARAGPUR

TENDER INVITATION
for
Supply, Unloading, Installation & Commissioning, and Training of
A VIBRATION SENSOR (ROBOT ASSISTED) FACILITY

Sealed tender offers are invited in two separate sealed covers (Technical and Commercial offers) from eligible manufacturers/suppliers or their direct Indian agents for the supply of the following equipment.

Supply, Unloading, Installation & Commissioning, and Training of
***A VIBRATION SENSOR (ROBOT ASSISTED) FACILITY* with ALL necessary software and accessories**

Please send offers, ALONG WITH DESCRIPTIVE CATALOGUE/ BROCHURE. The validity of the bid should be at least five months (150 days) or more from the date of the opening of this tender. Please ensure that your quotation reaches not later than **22.10.2018 (Monday) at 10:00 Hrs (Indian time)** at the following address:

Professor-in-Charge,
DHI Centre of Excellence on Advanced Manufacturing
Technology, (Inside Steel Technology Centre),
Indian Institute of Technology Kharagpur,
721 302, West Bengal, India

Earnest money (EMD) of **Rs. 8,00,000/-** is to be deposited in the form of Account Payee Demand Draft in favour of IIT Kharagpur, payable at Kharagpur, India. **Any bid which is not accompanied with an EMD, and Tender fee shall be summarily rejected.** Earnest money deposited will be forfeited if the tenderer withdraws or amends its tender or impairs or derogates from the tender in any respect within the period of validity of its tender. No interest will be paid on the earnest money of the unsuccessful bidders.

Tender Reference	**IIT/OTG1/CoE_AMT/DHI/2018/EQ1, dated 28/09/2018**
Tender Fee	**Rs 10,000/-** (Account payee Demand Draft in favour of IIT Kharagpur, payable at Kharagpur, India); Non-refundable
Last Date and Time for submitting the tender document	**22.10.2018 (Monday) at 10:00 Hrs. (IST)**
Time and Date of Opening of Technical Bids	**22.10.2018 (Monday) at 11:00 Hrs. (IST)** **(**in SRIC Conference Room**)**

Place of Opening Tender	In SRIC conference room, Indian Institute of Technology Kharagpur, 721 302, West Bengal, India
Address of Communication	Professor-in-Charge, DHI Centre of Excellence in Advanced Manufacturing Technology, Indian Institute of Technology Kharagpur, 721302, West Bengal, India
Contact Telephone Numbers	**+91- 3222 - 281576**
E-mail	**coeamt@iitkgp.ac.in**

General information about the requirement:

- *The required "**Vibration sensor (robot assisted) facility**" will have a **3D non-contact laser scanning vibrometer** mounted on a 6-axis **industrial robot** to record the vibration in vehicles, and other components. The robot will be mounted on a 4 meter long linear track.*
- *Laser scanning must be done at the given nodal points of the grid generated through a finite element analysis.*

- *The supplier must provide integrated solution for the **"Vibration sensor (robot assisted) facility"** including **hardware and software for accurate data acquisition and positioning of the robot**.*
- *The unit must also come with **proper sensing systems to avoid collision** during the movement of the laser scanner.*
- *The software must give the **animated deflection of shapes** along with **information of frequency and phase**. These must be able to be exported for **modal analysis in software**.*

Detailed technical specifications

A. Hardware requirements	
Vibrometer measurement frequency range (3D operation)	0-100 kHz
Number of acquisition channels	8 or more
Vibrometer must have spatial scanning facility	Scanning range: ± 20^o or higher
Scanning angular resolution	<= 0.002^o or better
Laser type	He-Ne
Eye safe class	II
System must be able to measure through water for submerged sample	
Scanning grid points density	500 x 500 or better
Data acquisition	24 bit or higher
Hardware (D/A) for signal output with sine chirp, random, ramp etc.	
Velocity measurement range	Must be at least 14 ranges with full scale 0.001 m/s or lower to 12 m/s
Best velocity resolution	<= 0.01 μm/s/√Hz
The system must have integrated geometry distance sensor with coaxial light path for 3D grid construction support for scanning the structures and to overlay the vibration data on the measured geometry.	
Sensor head should be of low height and compact style.	
Connection to the sensor should be through one cable.	
All the settings to be performed on the sensor head must be handled and controlled remotely without any manual operations.	
The facility must have an integrated camera for observing the test object	• Camera must be 20X optical zoom
	• Field view: 55^o x 32^o
Autofocus option must be available during the scan for minimizing the spot diameter and achieve highest spatial resolution during the scanning process	
Best frequency resolution at 100 kHz	< 8 Hz

Maximum number of measurement points at 1 measurement	> 250000 points		
The facility must be able to make the live vibration data audible and allow to store them as vibration signals.			
The facility must have a state-of-the-art work-station with 21-inch or higher screen (or a laptop with 15-inch screen) of 64-bit configuration with 1 TB or higher disk space, 32 GB or more RAM, and a suitable operating system. The computer must be a branded (Apple/Dell/HP/Lenevo) one.			
Tripods must be supplied along with the system for mounting the three laser heads.			
Cabinets for housing the PC, vibrometer, controller etc. must also be provided.			
Necessary hard-case must also be supplied along with the system for transportation.			
Stitching of the data sets must be enabled using the robot movement.			
The robot must be able to measure the vibration of the object by moving in seven degrees of freedom (including the 4 meter long linear track) with computer controlled and dictating points through the software for automatic full field measurements.			
B. Robot requirements			
Number of degrees of freedom	6 +1 (linear track)		
Number of controlled axes	7		
Rated payload	90 Kg or more		
Robot reach	3600 mm or more		
Positional Repeatability	± 0.06 mm or better (As per ISO 9283 standard)		
Protection rating	IP 65		
Protection rating (in-line wrist)	IP 65		
Range of axes movement and speed	a) Rotating column	**Range:** ± (180^o to 190^o) or more **Speed:** Minimum 100 ^{o}/s	
	b) Linking arm	**Range:** -110^o to +70^o or more **Speed:** Minimum 100^o/s	
	c) Arm	**Range:** -110^o to +150^o or more **Speed:** Minimum 110^o/s	
	d) Wrist	Pitching	**Range:** ± 350^o or more **Speed:** Minimum 280^o/s
		Yawing	**Range:** ± 120^o or more **Speed:** Minimum 250^o/s
		Rolling	**Range:** ± 350^o or more **Speed:** Minimum 280^o/s

This robot will be mounted on a linear track of 4 m length.
C. Software requirements
The robot assisted scanning laser vibrometer facility must be provided with the necessary software for supporting the following features:
• Vibrometer controller with basic software maintenance system.
• User defined (course/fine) scan grid setting with manual and optical distance sensor.
• User defined (course/fine) scan grid setting with manual and optical distance sensor.
• Data acquisition user defined, and automated storage settings.
• Image construction from grid points, and tailoring of images, and animations of vibration analysis.
• Import and export of data/images for extended/remote analysis.
• 3D time domain and frequency domain display of data and analysis of the image.
• Software for defining signal generators (output) with sine, chirp, random, ramp etc.
• Online software help for operation and troubleshooting the vibrometer system.
• Data acquisition setting software for synchronized measurements of working parameters such as surface vibration, excitation etc.
• Automatic alignment of laser spot in grid points using image processing by video triangulation.
• Ability to measure time domain data and generate animation to display in user selectable playback speeds.
• Signal averaging function must be available in both time domain and frequency domain measurements.
• The facility must be able to measure the geometry of measurement object at exact same points of the measured vibration points.
• The provided operating system must be licensed with a hard copy of the software backup.
• **Modal analysis software package for extracting the modal parameters and post processing.**
• **Post processing of measurement data for calculation of dynamic strain and stress.**
• **Licensed software for controlling the robot for full field measurement and stitching of the data.**
• Coherence optimizer must be provided for have controlled laser frequency stabilization.
• Principal component analysis for MIMO measurements

- Necessary software for retrieval of the data through external applications.

D. Accessories required

- A closed headphone (with internal limiter 90 dB or better for ear protection) having 3.5 mm and 6.3 mm TSR jack must be provided.
- Goggles must be provided to have a better visibility of the laser spot and will also help in adjusting the laser position.

E. Documentation

The following documents (hard copy 2 sets & soft copy in CD/ Flash Drive/ HDD) to be provided to IIT- Kharagpur:

- All the data and results of testing and calibration of the entire system at supplier site as well as at IIT- Kharagpur site shall be properly documented and supplied to IIT- Kharagpur.
- Calibration Certificates (traceable to National / International Standard) of all the artifacts/ reference standards used for the same shall be provided to IIT- Kharagpur.
- Operations, calibration, application software manual - This document should explain all the measurement options, calibration, application of the system with sketches and detailed explanation.
- System administration & maintenance manual - This document should explain the detailed system configuration and administration with the help of sketches. System manual should explain known possible errors and solution for the same. The safety instructions need to be clearly mentioned in this document.
- User manual and service manual (for both Mechanical and Electronic Hardware/ Circuits) in English language should also be provided.

F. Training

Extensive training shall be provided to IIT- Kharagpur scholars by the supplier at IIT Kharagpur. The training should cover complete operation, application software usage in all aspects of measurement and data analysis, part programming, robot programming, calibration, preventive maintenance and trouble shooting.

G. Warranty

- The machine shall have Comprehensive warranty (parts, labour and visit by the service engineers) for a minimum period of 3 years after commissioning for defect-free operation and specified accuracies at IIT- Kharagpur.
- Any defect observed during the warranty period shall be replaced/repaired free of cost with minimum down time. All the software updates during the warranty period shall be supplied, installed and trained to our personnel on real time basis at free of cost.
- All software updates must be provided during this period.

H. Annual Maintenance Contract (AMC) (after warranty period of 3 years) (optional)

- The supplier shall undertake Non-comprehensive AMC for a period of three years, after the expiry of comprehensive warranty of three years. The quote shall be in Indian Rupees since it is envisaged that Non-comprehensive AMC is to be carried out by the authorized service provider

of the manufacturer.
• The scope shall be for two preventive maintenance visits per year.
• The scope shall also include any number of breakdown visits. In case of any major breakdowns which need the intervention of Original Equipment Manufacturer (OEM), the quote shall include per visit cost for the same.

GENERAL TERMS & CONDITIONS

PLEASE SPECIFICALLY INDICATE THE FOLLOWING POINTS IN YOUR QUOTATIONS AND COMPLY THE TERMS AS MENTIONED HERE UNDER: -

1. TENDER ARE INVITED COMPLYING THE REQUIREMENT FOR TENDER AS DETAILED IN THE TENDER SPECIFICATION TO BE SUBMITTED IN THE COMPANY'S / FIRM'S LETTERHEAD NEATLY PRINTED / TYPED DULY SIGNED BY AUTHORIZED PERSON WITH THE SEAL OF THE BIDDERS. ALL ENVELOPES CONTAINING THE TENDER SHOULD BE PROPERLY SEALED. SEPARATE ENVELOPES SHOULD BE USED FOR TECHNICAL AND PRICE BID AND INDICATION TO THEIR EFFECT MAY PLEASE BE SUPERSCRIBED ON THE ENVELOPE.

THE FOLLOWING DOCUMENTS ARE REQUIRED FROM THE INDIAN AGENTS OF FOREIGN FIRMS:

1.1 FOREIGN PRINCIPAL'S PROFORMA INVOICE INDICATING THE COMMISSION PAYABLE TO THE INDIAN AGENT AND NATURE OF AFTER SALES SERVICE TO BE RENDERED BY THE INDIAN AGENT.

1.2 COPY OF THE AGENCY AGREEMENT WITH THE FOREIGN PRINCIPAL INDICATING THE NATURE OF AFTER SALES SERVICES, PRECISE RELATIONSHIP BETWEEN THEM AND THEIR MUTUAL INTEREST IN THE BUSINESS.

2. TECHNICAL CATALOGUE/LEAFLET SHOULD BE ENCLOSED WITHOUT FAIL. PROVIDE COMPLIANCE STATEMENT WITH RESPECT TO THE TECHNICAL SPECIFICATIONS MENTIONED ABOVE.

3. PLEASE CONFIRM WHETHER YOU ARE AUTHORIZED TO QUOTE ON BEHALF OF YOUR PRINCIPALS AND IF SO, PLEASE ENCLOSE A COPY OF SUCH AUTHORISATION WITH YOUR QUOTATION.

4. **PRICE BIDS FOR FOREIGN FIRMS**: PRICES ARE TO BE QUOTED ON '**EX-WORKS**' DULY PACKED OR ON **"FCA/FOB"** INTERNATIONAL PORT" BASIS AND ALSO INCLUDING AGENCY COMMISSION PAYABLE TO YOUR INDIAN AGENTS, IF ANY SHOWING CLEARLY THE FOLLOWING BREAK UP:-

   I) EX-WORKS PRICE
   II) PACKING & FORWARDING
   III) FREIGHT
   IV) ANY OTHER RELEVANT EXPENSES.
   V) TAXES PAYABLE BY THE INSTITUTE

INSURANCE WILL BE PAID BY OUR INSTITUTE SEPARATELY AND SHOULD NOT FORM PART OF THE QUOTED PRICE.

PRICE BIDS FOR INDIAN FIRMS: PRICES ARE TO BE QUOTED ON F.O.R., IIT KHARAGPUR, ON DOOR DELIVERY BASIS CLEARLY SHOWING THE BREAK UP.

5. **PERIOD OF VALIDITY**: BIDS SHALL REMAIN VALID FOR ACCEPTANCE FOR A PERIOD OF 150 DAYS FROM THE DATE OF OPENING.

6. INDIAN AGENTS ADDRESS AND PERCENTAGE OF AGENCY COMMISSION INCLUDED IN ABOVE F.O.B./EX-WORKS PRICE. (THIS WILL BE PAID TO THE INDIAN AGENTS IN INDIAN RUPEES ONLY AND NOT IN **FE).** PLEASE ENCLOSE COPY OF AGENCY AGREEMENT ENTERED INTO WITH YOUR PRINCIPALS INDICATING THE NATURE OF AFTER SALES SERVICES OF INDIAN AGENTS, PRECISE RELATIONSHIP & MUTUAL INTEREST IN THE BUSINESS.

7. **MEASUREMENTS/WEIGHT:** NETT/GROSS OF THE CONSIGNMENT. IN CASE OF AN ORDER, YOU SHALL USE AIR WORTHY PACKAGE (AS APPLICABLE) DULY CERTIFIED WITH DOCUMENTS – PLYTO – SANITARY CERTIFICATE (AS PER QUARANTINE ORDER 2003).

8. **SCOPE OF SUPPLY**: SHOULD INCLUDE FREE INSTALLATION AND COMMISSIONING

9. **PAYMENT TERMS** FOR FOREIGN FIRMS

   THE OFFER WILL BE MADE ON A SINGLE CURRENCY AND ONLY ONE PO WILL BE ISSUED FOR THE ENTIRE SCOPE OF THE SUPPLY.

   A) 90% PAYMENT THROUGH SIGHTDRAFT/FOREIGN DEMAND DRAFT/LC (EXCEPTIONAL CASES)/SWIFT TELE TRANSFER AFTER RECEIPT OF STORE IN GOOD ORDER AND CONDITION AND 10% AFTER SUCCESSFUL INSTALLATION & COMMISSIONING.

   B) BANK CHARGES ON LC/SD (WITHIN INDIA APPLICANT ACCOUNT AND OUTSIDE INDIA TO BENEFICIARY ACCOUNT).

   PAYMENT TERMS FOR INDIAN FIRMS

   A) 100% PAYMENT THROUGH CROSSED ACCOUNT PAYEE CHEQUE / ELECTRONIC TRANSFER AFTER RECEIPT OF STORE IN GOOD ORDER & CONDITION AND SUCCESSFUL INSTALLATION & COMMISSIONING.

   B) ENSURE MENTIONING

   i) BANK DETAILS OF THE BENEFICIARY, GST NO. AND PAN NUMBER

   ii) FULL NAME AND ADDRESS OF THE BENEFICIARY ON WHOM ORDER HAS TO BE PLACED

10. WHETHER ANY EXPORT LICENCE IS REQUIRED FROM YOUR GOVERNMENT, IF SO, PLEASE CONFIRM WITH DETAILS.

11. COUNTRY OF ORIGIN OF THE GOODS IS TO BE MENTIONED.

12. THE INSTITUTE SHALL PROVIDE THE CONCESSIONAL CUSTOMS DUTY AND EXCISE DUTY EXEMPTION CERTIFICATE AS PER GOVT. NOTIFICATION NO. 51/96 CUSTOMS DATED: 23.07.1996 AND CENTRAL EXCISE DUTY EXCEMPTION IN TERMS OF GOVT. NOTOFICATION NO. 10/97 – CENTRAL EXCISE DATED: 01.03.1997 AS AMENDED FROM TIME TO TIME.

13. **LIQUIDATED DAMAGES**: THE STORES SHOULD BE DELIVERED / DISPATCHED TO DESTINATION AND READY FOR OPERATION NOT LATER THAN THE DELIVERY DATE SPECIFIED. IT THE SUPPLIER FAILS TO DELIVER ANY OR ALL THE STORES OR PERFORM THE SERVICE BY THE SPECIFIED DATE, LIQUIDATED DAMAGES AT 1% PER MONTH OR PART THEREOF IN RESPECT OF THE VALUE OF STORES WILL BE DEDUCTED FROM THE CONTRACT PRICE SUBJECT TO A MAXIMUM OF 5%. ALTERNATIVELY, THE ORDER WILL BE CANCELLED AND THE UNDELIVERED STORES PURCHASED FROM ELSEWHERE AT THE RISK AND EXPENSE OF SUPPLIER.

14. **PATENT RIGHTS**: THE SUPPLIER SHALL INDEMNIFY THE PURCHASE AGAINST ALL THIRD PARTY CLAIMS OF INFRINGEMENT OF PATENT, TRADEMARK OR INDUSTRIAL DESIGN RIGHTS ARISING FROM USE OF THE GOODS OR ANY PART THEREOF IN INDIA.
15. ONLY THOSE BIDDERS WHO'S BIDS HAVE BEEN TECHNICALLY FOUND ACCEPTABLE WILL ONLY BE INVITED FOR PARTICIPATION IN THE PRICE BID.

16. THOSE BIDDERS WHO DO NOT RECEIVE ANY COMMUNICATION FOR PARTICIPATION IN PRICE BID OPENING MEETING MAY PRESUME THAT THEIR BID HAS NOT BEEN ACCEPTED BY THE INSTITUTE.

17. CONDITIONAL OFFER WILL NOT BE ACCEPTED.

18. LATE TENDERS i.e. TENDER RECEIVED AFTER THE DUE DATE AND TIME OF SUBMISSION AS MENTIONED ABOVE SHALL NOT BE ACCEPTED.

19. BIDDERS TO ENCLOSE THE FOLLOWING DOCUMENTS:-

    A) INCOME TAX RETURN (3 YRS) AND LATEST SALES TAX RETURN (GST No.), AND PAN NO.

    B) BANKER'S SOLVENCY CERTIFICATE

    C) SUMMARY OF AUDITED STATEMENT OF ACCOUNTS FOR THE LAST THREE YEARS TO BE ENCLOSED AND FINANCIAL HIGHLIGHTS AND THE KEY PERFORMANCE DURING THE LAST THREE QUARTERS TO BE ENCLOSED AS PER FORMAT:-

    COMPANY'S KEY PERFORMANCE

DESCRIPTION	JAN. TO MARCH	APRIL TO JUNE	JULY TO SEPT.
GROSS REVENUE			
PROFIT BEFORE TAX			
PROFIT AFTER TAX			
RETURN ON INVESTED			
CAPITAL (ROIC)			

    D) CUSTOMER SATISFACTION CERTIFICATE FROM ONE SUCH ORGANIZATION IS TO BE

ATTACHED WITH THE TECHNICAL BID AND PRICE BID.

E) NAME AND ADDRESS OF MINIMUM THREE CLIENTS TO WHOM SUCH EQUIPMENT HAVE BEEN SUPPLIED SHOULD BE MENTIONED.

20. THE INSTITUTE DOES NOT BIND ITSELF TO OFFER ANY EXPLANATION TO THOSE BIDDERS WHO'S TECHNICAL BID HAS NOT BEEN FOUND ACCEPTABLE BY THE EVALUATION COMMITTEE OF THE INSTITUTE.

21. ALL TENDERS (UNLESS OTHERWISE SPECIFIED) ARE TO BE SUBMITTED / HANDED OVER TO

OFFICE OF PROFESSOR-IN-CHARGE,
DHI CENTRE OF EXCELLENCE ON ADVANCED MANUFACTURING TECHNOLOGY, (*INSIDE STEEL TECHNOLOGY CENTRE*),
INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR, 721 302, WEST BENGAL, INDIA

AND ACKNOWLEDGEMENT TO BE OBTAINED.

IMPORTANT

1. IIT Kharagpur authority may accept or reject any or all the bids in part or in full without assigning any reason and does not bind itself to accept the lowest bid. The Institute at its discretion may change the quantity/ upgrade the criteria/ drop any item or part thereof at any time before placing the Purchase Order.

2. Promptly make arrangements for repair and/ or replacement of any damaged item (s) irrespective of settlement of claim.

3. In case of any dispute, the decision of the Institute authority shall be final and binding on the bidders.

4. For any query pertaining to this bid document correspondence may be addressed to
   Professor-in-Charge,
   DHI Centre of Excellence on Advanced Manufacturing Technology,
   (Inside Steel Technology Centre),
   Indian Institute of Technology Kharagpur 721 302,
   West Bengal, India
   E-mail: **coeamt@iitkgp.ac.in**

LAST DATE FOR SUBMISSION OF SEALED BIDS: 22.10.2018 (Monday) at 10:00 Hrs. (IST)

1) Please Note that the Institute remains closed during Saturdays & Sundays and all specified government holidays.

2) Fax, e-mail Tender will not be accepted.

3) The General Terms and Conditions as stated above relate to supply of stores/ equipment/ assets etc. and for specific service other terms and conditions of the Institute will apply.