

	<p style="text-align: center;">INDIAN INSTITUTE OF TECHNOLOGY MADRAS Chennai 600 036</p> <p style="text-align: center;">Telephone: (044) 2257 4070 E-mail: aarajan@iitm.ac.in</p>	
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Dr. A. Arockiarajan
Project Coordinator

Ref: APM/AARO/2020/ENQ1
Dated: 07.01.2020

Limited Tender No: APM/AARO/2020/ENQ1

Due Date: 28.01.2020, 5:00pm

Pre-Bid meeting: - Not required.

Bid opening meeting on Due Date: 29.01.2020, 4:00 pm

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of **“ACOUSTIC EMISSION SYSTEM- 4 CHANNELS”** conforming to the specifications given in **(Annexure-I)**.

Terms and Conditions of Limited Tender

1. **Preparation of Bids:** - The Limited tenders should be submitted under **Two bid system** (i.e.) Technical- and -Financial bid.
2. **Delivery of the tender:** - The tender shall be sent to the below-mentioned addresses either by post or by courier (duly sealed and super scribed on the envelope with the reference No and due date) so as to reach the following address before the due date and time specified in our Schedule:
Dr. A. Arockiarajan,
MSB226, Department of Applied Mechanics,
IIT Madras
Chennai - 600 036.
3. **Price:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to **Department of Applied Mechanics**.
 - a. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. IIT Madras is eligible for concessional GST and relevant certificate will be issued.
 - b. In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP (stating the Cost, Insurance, Freight separately) and indicating the mode of shipment.
4. **Terms of Delivery:** - The item should be supplied to our Departments as per Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.
5. **Catalogue:** Original catalogue (not any photocopy) of the quoted model duly signed must accompany the quotation in the Technical-cum-financial bid
6. **Late offer:** - The offers received after the due date and time will not be considered

7. **Payment:** - No Advance payment will be made for Indigenous purchase. However, 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done).
8. **Advance Payment:** - No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.
9. **On-site Installation:** - The equipment or machinery has to be installed or commissioned by the successful bidder within number of days (as prescribed by PI's) from the date of receipt of the item at site of IIT Madras.
10. **Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment which is not less than one year.
11. **Validity:** Validity of Quotation not less than 60 days from the due date of tender
12. **Technical Bid Opening:** The technical bid will be opened on **29.01.2020, 4:00 pm** at the Department of Applied Mechanics, IIT Madras and the **financial bids** of those tenders who are technically qualified will be opened at a **later date under intimation to them.**
13. **Performance Security:-**The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply within 21 days from the issue of work/purchase order. The Performance Security should be furnished in the form of an Account Payee DD / FD Receipt from the commercial bank (or) Bank Guarantee from any nationalized bank in India.
14. **Accept /Reject:** IIT Madras reserves the full right to accept / reject any tender at stage without assigning any reason.
15. **Settlement of Disputes:** Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.
16. **Risk Purchase Clause:** - In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
17. **Unsolicited offers:** "This notice is being published **for information only** and is not an open invitation to quote in this limited tender. Participation in this tender is by invitation only and is limited to the selected registered suppliers. Unsolicited offers are liable to be ignored. However, suppliers who desire to participate in such tenders in future may apply for registration as per procedure." The Website for Registration of vendors is <http://web.iitm.ac.in/supplier/> and the mail address for queries is "workflow@rt.iitm.ac.in".

Yours sincerely,

Dr. A. Arockiarajan,
MSB226, Department of Applied Mechanics,
IIT Madras
Chennai - 600 036.

SPECIFICATION FOR ACOUSTIC EMISSION SYSTEM- 4 CHANNELS

1. HARDWARE

1.1 Acoustic Emission system

The AE system shall consist of four AE channels and four parametric channels. The AE system shall be separated from the acquisition- and analysis PC or notebook. The AE system shall be easily connected to a PC or notebook using standard PC bus technology such as USB3. The AE system shall offer a self-test pulsing function with a configurable pul sing voltage from I V to at least 200 V. The AE system shall be in conformance with standard EN 13477-1 and shall be verified in conformance to EN 13477-2 with according verification protocol. The AE system shall come with robust transport and storage case.

1.2 Acoustic Emission signal processor

Each measurement channel must be fitted with at least 16bit AID converter at 40MHz sampling rate. Frequency band for measurement shall range from a low of 0,5kHz up to at least 2M Hz. The time resolution of arrival time shall be selectable. It shall be possible to measure arrival time of a hit with a resolution of 25ns. Acoustic Emission signal processors must be equipped with software selectable band pass filters for AE- feature extraction. At least I 0 high pass filters in the range bypass to about 500 kHz and I 0 low pass filters in the range 45 kHz to bypass shall be selectable. The order of the band pass filter shall be at least 8.

The Acoustic Emission signal processors must have the ability to record transient signals. Sample rate of transient data (waveform data) shall be selectable to fit the low pass filter cut-off and where needed to reduce amount of data that is recorded. Sample rate of transient data shall be selectable in the range of about 10 kHz to 40 MHz.

It shall be possible to capture waveforms with a fixed length and with a flexible length according to the hit duration.

By default, the same band pass filter configuration as for AE-feature data extraction shall be applied to transients that are recorded. For modal AE-analysis the Acoustic Emission signal processor shall record transient signals unfiltered (broad band) while triggering of AE-feature data sets shall be done with a narrow band pass filter.

The wavetbm1 recorder shall have memory buffers with at least I 00 MSamples/channel.

1.3 Acoustic Emission preamplifier

Four AE preamplifiers are required for passive AE-sensors. Preamplifiers shall have at least two amplification stages, preferably 34 dB and 40 dB. They shall allow to pass through a self-test voltage pulse of at least 200 V and should have following specifications.

Preamplifier Gain: 3dB or 40dB (selectable) into 50Q Bandwidth (-3dB): 2.5kHz to 2.4MHz (IOVpp)
Input impedance: 50MQ
Power Supply: 28Vpp, 24mA Pulse through: for upto 450Vpp Output range: IOVpp into 50Q Input range: IOOmYpk at 34dB
50mVpk at 40dB Temperature range: -20degC to +85degC
Cable length: 5m to be supplied to connect preamplifier with signal processing board.

1.4 Acoustic Emission sensor

Four robust full metal AE sensors are required with a frequency range of around 100 to 450kHz and a peak sensitivity at around 150kHz and should have following specifications

- Frequency Range: 100-450kHz
- Capacity (pF): 350
- Operating Temp in degC: -50 to +100
- Vibration-Sinus Sweep: 20ct/Min, 5 to 180Hz, 40g
- IP Rating: IP 40
- Size (DXH) (mm): 20.3x14.3
- Weight (g) : 26
- Case Material: SS (1.457111.4404) Wear Plate: SS (1.457111.4404)
- Connector: SMC
- Shield Cross-Talk < -80
- Cable length: 1.2m to be supplied to connect sensor with preamplifier
- Bidder to after Magnetic holder's for use of sensors on ferrous materials

1.5 Acoustic Emission accessories

For verification of AE-sensor coupling 1-lsu-Nilsen sources are required with 0.5mm diameter. Additional leads shall be supplied as well.

2. SOFTWARE

2.1 Analysis software

The analysis software shall offer the possibility to define analysis routines from in-built functions such as filtering data and statistical evaluation of data.

Data shall be displayed in diagrams and tables. There shall be no limit to the maximum number of diagrams and tables used in an analysis setup.

Diagrams and tables shall be arranged in tabs. Free positioning of diagrams and tables on tabs shall be possible.

The operator shall have the possibility to choose the attributes to be displayed in individual diagrams and tables. Any measurement result or any result of an analysis routine shall be able to be displayed in the one or other way. Diagrams shall have the

possibility to define planes for data display, filter for planes, scaling of axes, axis limits, etc.

Data manipulation by using logical filter conditions or graphical filters is required. Functions or routines for simple statistical analysis of data are required.

2.2 AE-source location

Location algorithms shall be part of the analysis software. Their results shall be furnished to subsequent data processing and displaying of data.

At least linear, planar and cylindrical location algorithm is required.

2.3 Waveform I transient analysis

Displaying transient data and their FFT shall be possible within the analysis software. For analysis of waveforms /transients a software package for extracting features from the frequency domain shall be available. FFT-feature extraction shall be able to run in parallel to the acquisition software in on-line mode, FFT-features shall be furnished to the analysis software in order to be used in data processing routines of the analysis software and to be displayed in diagrams and tables

2.4 Data file format

A special requirement for the software is open access to recorded AE-feature- and transient data. Customer written scripts and programs (e.g. Matlab, Python, C) shall be able to access the data in data files. The favorite solution of this requirement is an open data file format, which is widely accepted and allows access to stored measurement data with available third party tools.

2.5 SW License

The SW license shall allow to run the software on at least four computers in parallel. A free of cost update of the software to a new SW-release shall be possible for at least two years after delivery.

The entire system should have two years warranty and support.

Note:

The sealed quotation to be sent to,

Dr. A. Arockiarajan
MSB226, Dept. of Applied Mechanics, IIT Madras, Chennai-600036,
Tamil Nadu, India.