NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA-769008 (ODISHA)

An Institute of National Importance under Ministry of HRD, GOI

NOTICE INVITING TENDER

Tender Notification No: NITR/PW/ME/2018/46 **Dated: 20/08/2018**

The National Institute of Technology, Rourkela invites bids from the eligible bidders for procurement of **Dynamics Response Monitoring System and accessories**.

Last date of Submission of bid **: 18/09/2018 at 11:00 AM**

Date of opening of technical bid **: 19/09/2018 at 11:00 AM**

For Details: http://nitrkl.ac.in/OldWebsite/Jobs_Tenders/9Equipment/Default.aspx

Contact: Dr. Tarapada Roy , ME; Ph: +91-661-2462507;

Email: tarapada@nitrkl.ac.in

Bidding through: https://eprocure.gov.in/eprocure/app

sd/-
REGISTRAR

NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA-769008, ODISHA

(TENDER NOTICE NO.: NITR/PW/ME/2018/46 DATED: 20/08/2018)

(PURCHASE OF DYNAMICS RESPONSE MONITORING SYSTEM AND ACCESSORIES)

Item No	DESCRIPTION	Quantity
1	Dynamics Response monitoring system	1 Unit
2	Modally Tuned Impact Hammer	1 Unit
3	Accelerometers (both SINGLE AXIS and TRI-AXIAL COMBINATION)	SINGLE AXIS (2 Unit) and TRI-AXIAL (1 Unit)

1. Quantity required **: as mentioned above** (**All information regarding technical specification provided in the Annexure-I**)
2. Delivery **:** Within **60 days** from the date of purchase order
3. **Last Date of submission of Bid : 18/09/2018 at 11:00 AM**
4. **Date of opening of technical bid : 19/09/2018 at 11:00 AM**
5. The firm should not have been black listed at any time.
6. The submission of following bids by the tenderer should be through https://eprocure.gov.in/eprocure/app. Please follow the guidelines as per the portal.

Purchase of Dynamics Response Monitoring System and accessories (Tender Notice No.: NITR/PW/ME/2018/46 dated: 20/08/2018) Due on 18/09/2018 at 11:00 AM

7. **Liquidated damage clause** will be charged for any delay in supply of goods.
8. The validity of the tender shall be **90 days** from the date of opening of the bids.
9. Detailed advertisement including all tender documents is also available in our website at http://nitrkl.ac.in/OldWebsite/Jobs_Tenders/9Equipment/Default.aspx .
10. NIT reserves the right to qualify or deny prequalification of any or all applicants without assigning any reasons.

(REGISTRAR)
NIT, Rourkela
Fax No- 0661-2462022
Ph. No -0661-2472021

Annexure-I

Specification for Dynamics Response Monitoring System and accessories

Item No	DESCRIPTION
1	**Dynamics Response Monitoring System** **<u>Basic requirements of the system:</u>** 1. It must be **a 10 channel** on-line/stand-alone PC-free, real-time (gap-free analysis), portable, FFT spectrum analyzer cum vibration acquisition system with minimum of 40KHz bandwidth with an option of increasing the channel count in future through addition of modules. The software options must be exchangeable and flexible. **Details of configuration must be provided.** 2. The system must be configured such that different channels can be viewed in different windows with data storage facilities on the analyzer. These windows must be large and distinct. **Details of configuration must be provided.** 3. The system must provide real time multi-analysis capabilities using powerful internal Digital Signal Processors (DSPs) for maximum computation power. It must be possible to do real time analysis/measurement as well as parallel/simultaneous recording with reference signal (speed signal). **Details of configuration must be provided.** 4. It must have1GB/s Ethernet for communication to a controller for data recording, analysis and report generation purpose. **Details of configuration and deviation must be provided.** 5. There must be facility for data sharing. **Details of configuration must be provided.** 6. Standalone digital data recording measurement must be possible. **Details of configuration must be provided.** 7. Carrying case must be supplied with the analyzer along with the instruction manual and software CD, additional post processing/report license 8. The scope of work includes installation and training of the entire system. **<u>Front end/Hardware:</u>** 1. It must be portable, rugged, modular and light weight. Kindly mention the weight and dimensions of the unit. 2. It must have a bright LCD and large accessible buttons for easy setup of the analyzer without using a PC. Details of

configuration must be provided.

3. It must be possible to interface different transducers like ICP accelerometer, force sensor, microphones, pressure sensors (2 or 4mA), proximity probes/eddy probes, key phasors etc. Details of configuration and deviation must be provided.
4. Connectors: BNC
5. **Input channels:**
   - No. of channels: **8 universal channels**, with status LED for each channel.
   - Sampling rate: 100KHz minimum on each channel
   - Input Range: ± 100 mV to ± 40 V range (full scale).
   - Input Protection: ± 60 V
   - Input Coupling: AC/DC/ICP coupling (grounded and floating)
   - Resolution: 24 bits ADCs for each input
   - Input accuracy: Phase match: minimum ± 0.02°(A must need feature for modal analysis),
   - Amplitude match: minimum ± 0.02dB,>140 dB dynamic range
   - Filtering: High/Low Pass - Stop/Pass band – Integrator (single/double) – Differentiator – A/C/Z filters

Details of deviation must be provided.

6. **Output/Generator channels:**
   - No. of channels**: 2 nos.** with status LED for each channel
   - Output range: ± 40V
   - Output resolution: 24 bits DACs
   - Output frequency: DC to 40 kHz.

- THD < 0.002% at 1kHz (Must need feature for testing's using modal shaker)
- It must generate minimum two Pure tones, two step/swept sine with phase offset and frequency tracking, two Multi-sine
  Two uncorrelated random noises (white and pink) with burst, two Chirps, with option of File playback, Input playback.

Details of deviation must be provided.

7. **Tachometer channels:**
   - No of channels: Minimum 2nos.
   - Range: ±10 V
   - Time resolution > 160 ns (0.06° at 1 kHz)
   - Sampling rate: minimum 6.4MHz to ensure accurate rotating speed and phase measurement

8. Internal removable memory/hard disk: minimum 60 GB shock proof SSD or more with connection to PC through USB 3.0 to allow fast and easy post-processing or back-upand USB powered

9. External Power supply: External 220-240V AC power supply to power up the unit and recharge the built-in batteries.
10. Internal Battery: It must last at least 1 hour on full charge for 6 channels

Details of deviation must be provided.

SOFTWARE COMPATIBLE TO DYNAMIC RESPONSE MONITORING SYSTEM:

1. **Recorder module:**
   - To capture raw, time-domain data during acquisition and analysis process.
   - It must be possible to use the recorded data for post-processing /exporting to other software like Matlab, Labview..etc
   - It must be possible to record all channels at 40kHz + 2 ext. sync + DC recorder / player
   - It must be possible to select two bandwidths on the same record
   - There must be an option to Record from start to stop, start to time and time to stop, multi-record file, file split: tracks and time
2. **Waterfall module:**
   - It must collect and synchronize the spectra, levels, orders and trigger blocks providing flexible 3D waterfall and profiles. Color-spectrogram, Bode plots, order tracking trend plots, Vs time, RPM, Power or Torque.
   - No. of slices : 2 to 10000minimum
   - Profiles and 3D real-time displays
   - One shot or continuous scrolling acquisition
   - DC, RPM and Time reference for profiles and 3D displays
   - Synchronized cursors between displays.
3. **Monitoring Module:**
   - Minimum 2 additional analysis channels (time and spectral domain) (401 lines, Hanning) analyzer,
   - Hot plug on any input (do not stop running analysis or recording)

4. **Narrow band FFT module:**
   - Bandwidth: 40 kHz, No. of lines: 100 to 6400, minimum and 25000 lines maximum

- Time or spectral domain averaging linear, exponential, peak hold & ref peak hold averaging, full matrix cross spectra, FRFs H1 & H2, Coherence
- 2 to 128 time FFT zoom simultaneous with wide band FFT, Frequency Domain Synchronous, Averaging, Independent filters (HP, LP, PB, SB, dt, dt2) on each channel

Data Import/Export Feature:

Export: UFF, TXT, SDF, Matlab, Wav audio (with frequency selection)

IMPORT: TXT, AE2, Wav, Excel

Displays:

- Time: Triggered blocks, Weighted blocks, Filtered blocks, Compressed view of large files, X/Y view of triggered blocks.
- Narrow Band: Magnitude, Phase, Bode, Imaginary & real part, Polar, Magnitude + phase overlay.
- Profiles: RPM, DC, max, min, RMS, kurtosis, order and overall Vs time or RPM.
- Waterfall: 3D Narrow band, 3D octave, Color Spectrogram ,X/Y, Y/ref, order and frequency extraction views, RPM vs Frequency vs Vibration Amplitude must be possible to display.
- Digital Display: of RPM, DC, max, min and Order (magnitude and phase) Alarm levels.
- On all displays: Trace overlay with saved result or real-time measurement, Y scale Lin, Log or dB, EU, EU2, Eu2 / Hz, EU/Hz, Zooms & translations on X, Y, Z axis, Dual cursor, Multi-graph, multi-trace Markers (peak, max, sideband, power band, harmonics, free), Operators, compare, average Filled traces, Magnitude grouping

Details of configuration must be provided.

MODAL ANALYSIS SOFTWARE SOFTWARE COMPATIBLE TO DYNAMIC RESPONSE MONITORING SYSTEM:

- compatible to the supplied hardware, Data must be directly acquired on to software in real time.
- Creation of simple and complex geometries. Import of geometries in standard formats like. iges
- Features like, geometry creation, data acquisition, ODS, EMA(SIMO, MIMO, Narrow band & wide band), OMA,MIC,MAC
- Display of ODS animation.
- Calculation of FRF, real & imaginary, magnitude & phase
- Import of modal results from simulation software for MAC

	calculations • Acceptance of time data, Signal file and triggered block from uff 58/58b **Details of configuration must be provided.** **<u>TURBO-MACHINERY VIBRATION SOFTWARE MODULE TO DYNAMIC RESPONSE MONITORING SYSTEM (OPTIONAL):</u>** It should display/have the following features Tabular list: Gap voltage, Overall, orders amplitude and phase (0.5X, 1X, nX), Sub1X, SMax • Orbits (Overall and nX filtered) • Full Shaft Motion: Shaft centreline + clearance circle + orbits • Bode, polar and trend plots • Full and Half Spectrum, cascade and waterfall • Gap voltage reference • Slow roll vector reference for run-out correction • Real-time acquisition, post analysis (based on raw signal recording) and data navigation
2	**Modally Tuned Impact Hammer compatible to dynamic response monitoring system** Nominal Specification Sensitivity: 10mV/lbf Freq.: 8kHz Force range: 2200N Head weight: 100gm BNC-BNC cable, 10ft Resonance frequency :50 kHz Head diameter inches :0.75 mm Impact tip diameter inches: 0.25 mm DC output bias :9 to 10 Vdc Output impedance :100 Ohms Full scale output: ±5 V Supply current :2 to 10 mA Temperature range :-67 to 257 °C Overall length in :8.76 mm Sensor material: 17-4 PH stainless steel Handle material Fiberglass with rubber grip **Details of deviation from the above specifications must be provided.**
3	**Accelerometers compatible to dynamic response monitoring system** • Sensitivity: 100mV/g • Range: ±50g

	• Shock limit:5000g • Freq response: 1Hz to 10kHz • Temp range: -55°C to 125°C • Hermetic seal: YES • Mounting method: Stud type. Suitable mechanical arrangement for mounting can be done. • Cable: Length 20ft (Higher or lower length of cable available) • Triaxial Mounting Adapter • Accelerometers that must be used as both SINGLE AXIS and TRI-AXIAL COMBINATION **Details of deviation from the above specifications must be provided.**

Other Qualification Criteria:

1. At least five user names and contacts from NIT/IIT/reputed Indian institute/Govt. R&D organizations must be provided where the above equipment and accessories (**Annexure-I**) have been supplied in last five years. Scan copies of the minimum five purchase orders of the above equipment and accessories (**Annexure-I**) must be enclosed along with the technical bid.
2. There must be a local calibration and maintenance center with availability of the spares in India.
3. Scanned copies of the technical brochure of the above equipment and accessories (**Annexure-I**) given in the quotation must be included in the technical bid.
4. Web references must be provided along with the technical bid.
5. Pointwise technical compliance along with any deviation of the mentioned specifications (**Annexure-I**) must be indicated along with technical documents.
6. Average annual turnover of the tenderer should be at least Rs 2 Crore in the financial years 2017-18.
7. Profit and loss statements, and balance sheet of the financial year 2017-2018 (as on year ended i.e. 31.03.2018) must be provided along with the technical bid.
8. Income tax return (ITR) of the assessment year 2017-2018 must be provided along with the technical bid.
9. Customized equipment and accessories (as per **Annexure-I**) will not be accepted. The standard equipment and accessories (as per **Annexure-I**) will only be accepted.
10. Dealership Certificate and Proprietary Nature Certificate (If applicable) must be provided along with technical bid.