



**SPONSORED RESEARCH, INDUSTRIAL CONSULTANCY &  
CONTINUING EDUCATION CELL  
NATIONAL INSTITUTE OF TECHNOLOGY  
ROURKELA – 769 008, ORISSA**

**Advertised Tender Enquiry**

**Department: Mechanical Engineering**

**Tender Notification No: NITR/PW/ME/2018/46**

**Date: 20/08/2018**

To,  
CPP Portal  
(e-Procurement)

**Important Dates**

<b>Event</b>	<b>Date</b>	<b>Time</b>
Pre-bid Conference	NA	NA
Last Date of submission of Bid	<b>18/09/2018</b>	<b>11:00 AM</b>
Date of Opening of technical bid	<b>19/09/2018</b>	<b>11:00 AM</b>

Dear Sir,

We intend to purchase the commodities specified below and invite quotations in accordance with the terms and conditions detailed in the bid document. If you are interested, kindly send your offer with prices and complete terms within the time mentioned above.

For any clarification:

**ATTENTION:**

Principal Investigator: **Prof. Tarapada Roy**  
Department of Mechanical Engineering  
NATIONAL INSTITUTE OF TECHNOLOGY  
ROURKELA – 769 008, ORISSA

Yours sincerely,

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Name: Prof. Tarapada Roy  
Principal Investigator:  
Project Code: NITR/SR/17/ME/002

**Encl:**

- (1) Schedule of requirement, specifications, dates etc.**
- (2) Bid document containing detail terms and conditions.**

## 1. Schedule of requirements

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) tri-axial (1 unit)

## 2. Specifications and allied Technical Details

\* Attach User list along with the quotation

## 3. Format of Quotation (tick appropriate box)

It is a two part bid with separate techno-commercial and price bids

4. The bid should be submitted through <https://eprocure.gov.in/eprocure/app>

5. Quotations should be valid for a period of **90** days from the closing date of the bid.

## 6. Some important dates:

Pre-bid Conference	Date: <u>NA</u>	Time: <u>NA</u>
Last date of submission of bid:	Date: <b>18/09/2018</b>	Time: <b>11:00 AM</b>
Date of opening of technical bid:	Date: <b>19/09/2018</b>	Time: <b>11:00 AM</b>

7. **Warranty** of minimum **01** years must be provided.

8. **GST:** GST should be charge according to applicable rates.

9. **Bid Security:** Bid Security in shape of Bank Guarantee/DD (Demand Draft) for **INR 42,000/-** (Rupees forty two Thousand Only) and Tender Cost (Non- refundable) in the form of DD for **INR 500/-** (Rupees Five Hundred Only) in favor of **Director, NIT Rourkela** Payable at Rourkela from any Scheduled Commercial Bank except Co-operative and Gramin bank. And Bank Guarantee/DD for the Bid-Security should remain valid for a period of **45 days** beyond the bid validity period from the date of opening of bids. Bid security of unsuccessful bidders should be return to them at the earliest and latest on or before the **30<sup>th</sup> days** after the award of the contract. **EMD (Earnest Money deposit)** and **Tender Cost** should reach physically through speed post/ register post/courier, containing in an envelope & superscripted with subject, tender reference number addressing to **Registrar, NIT Rourkela- 769008, Odisha; Attention: HOD(ME) on or before 19/09/2018 at 11:00 AM**

10. **Performance Security: Not applicable**

11. Please go through the enclosed "bid document" carefully for other bidding instructions.

12. Please send your quotations through <https://eprocure.gov.in/eprocure/app>

13. For technical details, you may contact

**Prof. Tarapada Roy**

Principal Investigator:

Project Code: NITR/SR/17/ME/002

Department of Mechanical Engineering,

National Institute of Technology,

Rourkela - 769 008

Phone: 0661 - 2462507

Fax: +91 - 661 - 2462501

E-mail: [tarapada@nitrkl.ac.in](mailto:tarapada@nitrkl.ac.in) / [tarapadaroy@gmail.com](mailto:tarapadaroy@gmail.com)

NB: ***Please furnish your Dealership Certificate (must) and Proprietary Nature Certificate (If applicable)***



## **BID DOCUMENT**

### **1. Instructions to the bidders**

- 1.1 Bids are invited on behalf of the Director, National Institute of Technology (NIT), Rourkela – 769 008, Orissa, from the intending bidders for supply of the goods/stores/ equipment for the Institute as detailed in the enquiry letter.
- 1.2 The bidders should quote their offer/rates in **BOQ** in clear terms without ambiguity.
- 1.3 In case of any discrepancy between the rates in figures and that in words, the rate in words will be accepted as correct.
- 1.4 The last date for receipt of the bid is marked in the enquiry.
- 1.5 The bids should be uploaded in <https://eprocure.gov.in/eprocure/app> Please follow the guidelines of the site.
- 1.6 If a prospective bidder requires any clarification in regard to the bidding documents, he may make a request the concerned officer or faculty member at least 15 days before the deadline for receipt of bids.
- 1.7 Bids received after the deadline of receipt indicated in para 1.4 above, shall not be taken in to consideration.
- 1.8 Each bidder shall submit only one bid. A bidder, who submits more than one bid, shall be disqualified and considered non-responsive.
- 1.9 (In respect of high value plant, machinery etc. of a complex and technical nature). The bids may be submitted in two parts, viz., technical bid and financial bid.
- 1.10 The bidder has to sign in full at all pages of the scanned part of the bidding document. No over-writing in those pages is acceptable.
- 1.11 If any bidder does not fulfill technical specification, his/her eligibility will be cancelled even if his/her price got L1 status.

### **2. Conditions of the bid**

- 2.1 The rates quoted should preferably be net, inclusive of packing, forwarding, freight, Insurance and all other incidental charges excluding taxes. In case these charges are quoted extra in addition to the quoted rates, the amount thereof or Ad Valorem rate must be specified. Packing, forwarding, freight, entry tax etc., when quotes separately are reimbursable at actual. If external agencies are employed, their receipts must be enclosed with the invoice.
- 2.2 Duties and Taxes are to be quoted separately. Ad Valorem rates thereof should be clearly indicated with reference to the relevant Acts and Rules.

**It may be noted that the Institute is exempt from paying Excise Duty vide Government Notification No. 10/97 dated 01.03.1997 [Registration No.: TU/V/RG-CD (227)/2011, dated 10.10.2011. The Institute is not authorized to issue C or D forms. GST may be charged at applicable rates.**

- 2.3 The goods are required to be delivered at the indenting Department of NIT, Rourkela, and must be reached within **60 days** from the date of placement of the supply of order under the risk and arrangement of the bidder and offers with delivery beyond the above period shall be treated as unresponsive. In case the delivery time is higher, the same must be mentioned clearly in the quotation.
- 2.4 The bid should remain valid for a period of **90 days** from the date of opening. In case your offer has a different validity period that should be clearly mentioned in the quotation.
- 2.5 Conditional discount, if any, offered by the bidder shall not be considered at the time of evaluation.
- 2.6 The goods offered should strictly conform to the specification and technical details mentioned in **Annexure-I**.
- 2.7 The Institute may like to conduct pre-dispatch inspection of goods, where applicable.
- 2.8 Period of guarantee/warranty, where applicable, should be specified in the bid.
- 2.9 If the successful bidder, on receipt of the supply order, fails to execute the order within the stipulated period, in full or part, it will be open to the Director, NIT, Rourkela to recover liquidated damage from the firm at the rate of 1 percent of the value of undelivered goods per month or part thereof, subject to a maximum of 5 percent of the value of undelivered goods. Alternatively, it will also be opened to the Director, to arrange procurement of the required goods from any other source at the risk and expenses of the bidder.
- 2.10 The successful bidder may be required to execute a contract, where applicable.
- 2.11 The bidder has to furnish up to date GST and Income Tax Clearance Certificate along with the bid.
- 2.12 Payment (100 percent) will be made by Account Payee Cheque /Bank Draft, within 30 days from the date of receipt of the goods in good condition or receipt of the bill, commissioning of the equipment, and after successful installation and demonstration where ever applicable, whichever is later/latest.
- 2.13 In case of Advance payment, the payment will be made on either in Foreign Demand Draft or Wire Transfer only. The proforma invoice copy need to be sent for advance payment.
- 2.14 In the event of any dispute arising out of the bid or from the resultant contract, the decision of the Director, NIT, Rourkela shall be final.
- 2.15 The bid document/resultant contract will be interpreted under Indian Laws.

## Specification for Dynamics Response Monitoring System and accessories

Item No	DESCRIPTION
1	<p data-bbox="300 282 954 315"><b>Dynamics Response Monitoring System</b></p> <p data-bbox="300 365 869 398"><b><u>Basic requirements of the system:</u></b></p> <ol data-bbox="352 443 1449 1574" style="list-style-type: none"> <li data-bbox="352 443 1449 678">1. It must be a <b>10 channels</b> 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. <b>Details of configuration must be provided.</b></li> <li data-bbox="352 689 1449 846">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. <b>Details of configuration must be provided.</b></li> <li data-bbox="352 857 1449 1093">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). <b>Details of configuration must be provided.</b></li> <li data-bbox="352 1104 1449 1216">4. It must have 1GB/s Ethernet for communication to a controller for data recording, analysis and report generation purpose. <b>Details of configuration and deviation must be provided.</b></li> <li data-bbox="352 1227 1449 1294">5. There must be facility for data sharing. <b>Details of configuration must be provided.</b></li> <li data-bbox="352 1305 1449 1373">6. Standalone digital data recording measurement must be possible. <b>Details of configuration must be provided.</b></li> <li data-bbox="352 1384 1449 1496">7. Carrying case must be supplied with the analyzer along with the instruction manual and software CD, additional post processing/report license</li> <li data-bbox="352 1507 1449 1574">8. The scope of work includes installation and training of the entire system.</li> </ol> <p data-bbox="300 1597 657 1630"><b><u>Front end/Hardware:</u></b></p> <ol data-bbox="395 1641 1449 2080" style="list-style-type: none"> <li data-bbox="395 1641 1449 1720">1. It must be portable, rugged, modular and light weight. Kindly mention the weight and dimensions of the unit.</li> <li data-bbox="395 1731 1449 1843">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.</li> <li data-bbox="395 1854 1449 2011">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.</li> <li data-bbox="395 2022 699 2056">4. Connectors: BNC</li> <li data-bbox="395 2067 707 2080">5. <b>Input channels:</b></li> </ol>

- No. of channels: **8 universal channels**, with status LED for each channel.
- Sampling rate: 100KHz minimum on each channel
- Input Range:  $\pm 100$  mV to  $\pm 40$  V range (full scale).
- Input Protection:  $\pm 60$  V
- Input Coupling: AC/DC/ICP coupling (grounded and floating)
- Resolution: 24 bits ADCs for each input
- Input accuracy: Phase match: minimum  $\pm 0.02^\circ$  (A must need feature for modal analysis),
- Amplitude match: minimum  $\pm 0.02$ dB, >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:  $\pm 40$ V
  - 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 2 nos.
- Range:  $\pm 10$  V
- Time resolution > 160 ns ( $0.06^\circ$  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-up and 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 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.**

**TURBO-MACHINERY VIBRATION SOFTWARE MODULE COMPATIBLE TO DYNAMIC RESPONSE MONITORING SYSTEM (OPTIONAL):** 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 centerline + 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

**Details of configuration must be provided.**

<p><b>2</b></p>	<p><b>Modally Tuned Impact Hammer compatible to dynamic response monitoring system</b>  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</p> <p>Handle material Fiberglass with rubber grip</p> <p><b>Details of deviation must be provided.</b></p>
<p><b>3</b></p>	<p><b>Accelerometers compatible to dynamic response monitoring system</b></p> <ul style="list-style-type: none"> <li>• Sensitivity: 100mV/g</li> <li>• Range: ±50g</li> <li>• Shock limit:5000g</li> <li>• Freq response: 1Hz to 10kHz</li> <li>• Temp range: -55°C to 125°C</li> <li>• Hermetic seal: YES</li> <li>• Mounting method: Stud type. Suitable mechanical arrangement for mounting can be done.</li> <li>• Cable: Length 20ft (Higher or lower length of cable available)</li> <li>• Triaxial Mounting Adapter</li> <li>• Accelerometers that must be used as both SINGLE AXIS and TRI-AXIAL COMBINATION</li> </ul> <p><b>Details of deviation must be provided.</b></p>

**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.

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