

Technical specification for proposed
Dynamics testing module

Sr. No.	Specification
1.	<p>Impulse Hammer:</p> <ul style="list-style-type: none"> • A general purpose IEPE impulse hammer to excite structures or machinery with a definable impulse force. The impulse is used to identify resonances, an important measurement parameter for the study of dynamic behaviour, as well as to help determine the overall structural health of a test specimen. • Interchangeable tips for excitation of different frequency ranges • Additional mass attachments for increasing the force imparted • Sensitivity ~ 2.2 mV/N • Range ~ 2000 N • Weight of the head ~ 100 g • Connector type ~ BNC • Output voltage ~ ± 5 V • Supply current ~ 2 to 20 mA • Tips: Aluminium, Plastic and soft plastic • Resonant frequency ~ 75kHz • Coaxial Connection Cable: 10ft BNC to BNC shielded and Teflon jacketed cables with moulded strain relief on BNCs
2.	<p>Triaxial Accelerometer:</p> <ul style="list-style-type: none"> • A case isolated triaxial IEPE accelerometer that includes a ceramic shear sensing element packaged in a lightweight titanium housing • Hermetically sealed units for reliable operation in high humidity and dirty environments and case isolated to avoid EMI/ground loop interference. • Sensitivity ~ 100 mV/g • Acceleration range ~ ± 50 g • Frequency range ~ 3000 Hz • Weight < 10 g • Connector type: 4-pin • Transverse sensitivity ~6 % • Supply current ~ 2 to 20 mA • Noise floor, max $\leq 0.001 g_{rms}$ • Mounting: Magnetic mount • Coaxial Connection Cable: 5ft 4pin to (3) BNC connection cable, which is shielded and Teflon jacketed cables and has moulded strain relief on BNCs
3.	<p>Uniaxial Accelerometer:</p> <ul style="list-style-type: none"> • A case isolated uniaxial IEPE accelerometer that includes a ceramic shear sensing element packaged in a lightweight titanium housing • Hermetically sealed units for reliable operation in high humidity and dirty environments and case isolated to avoid EMI/ground loop interference.

	<ul style="list-style-type: none"> • Sensitivity ~ 100 mV/g • Acceleration range ~ ± 50 g • Frequency range ~ 10000 Hz • Weight < 10 g • Connector type: 5-44 coaxial • Transverse sensitivity ~ 5 % • Supply current ~ 2 to 20 mA • Mounting: Adhesive mount • Coaxial Connection Cable: 5ft 5-44 to BNC connection cable, which is shielded and Teflon jacketed cables and has moulded strain relief on BNCs
4.	<p>Load Cell:</p> <ul style="list-style-type: none"> • An IEPE force sensor designed to measure dynamic forces up to 4,500 N over a wide frequency range. • Built-in electronics eliminating the need for an external charge amplifier and converter. • Using a quartz sensing element, operating in compression mode and packaged in a rugged stainless-steel housing with 1/4–28 tapped holes located at both the top and bottom of the sensor housing for ease of mounting. • Sensitivity ~ 2.2 mV/N • Compression range ~ 2000 N • Tension range ~ 2000 N • Weight < 25 g • Connector type: 10-32 • Resonant frequency >20000 Hz • Supply current ~ 2 to 20 mA • Coaxial Connection Cable: 5ft 4pin to (3) BNC connection cable, which is shielded and Teflon jacketed cables and has moulded strain relief on BNCs
5.	<p>Vibration Input Module:</p> <ul style="list-style-type: none"> • Capable of measuring signals from integrated electronic piezoelectric (IEPE) and non- IEPE sensors such as accelerometers, tachometers, and proximity probes • Incorporating software-selectable AC/DC coupling and IEPE signal conditioning. The input channels must simultaneously measure signals. Each channel must have a built-in anti-aliasing filters that automatically adjust to your sample rate. • Number of channels: 4 to 8 • Max. Sampling rate: 51.2 kS/s/channel • Analog Voltage range: ± 5 V • IEPE excitation: Yes • Front connections: 4 \times BNC • Anti-aliasing filter: Built in • Compatibility: Compatible with DAQ chassis
6.	<p>DAQ chassis:</p> <ul style="list-style-type: none"> • Small, portable sensor measurement systems providing the plug- and- play simplicity of USB to sensor and electrical measurements. • It must control the timing, synchronization, and data transfer between I/O modules and an external host. You can use this chassis with a combination of C Series I/O modules to

	<p>create a mix of analog I/O, digital I/O, and counter/timer measurements.</p> <ul style="list-style-type: none"> • Capability to run seven hardware-timed operations simultaneously, with independent rates for analog input. • Slots: 4 to 8 • Bus connector: USB • Power cord: 250V,10A, India • Input/output: Analog and digital • Compatible with the Vibration input module, Voltage output module and the temperature input module for simultaneous functioning
7.	<p>Voltage Output Module:</p> <ul style="list-style-type: none"> • A simultaneously updating analog output module with overvoltage protection, short-circuit protection, low crosstalk, fast slew rate, high relative accuracy, and NIST- traceable calibration. • Number of channels: 4 • Max. Sampling rate: 100 kS/s/channel • Analog Voltage range: ± 10 V • Analog output resolution: 16 bit • Front connections: Spring Terminal • Simultaneous updation of analog output: Yes • Compatibility: Compatible with DAQ chassis
8.	<p>Accessories:</p> <ul style="list-style-type: none"> • Coaxial cable for impact hammer: 01 • Coaxial cable for triaxial accelerometer: 01 • Magnetic mount for triaxial accelerometer: 01 • Coaxial cable for uniaxial accelerometer: 01 • Mounting wax (~20g): 01 • Power cord and connector for DAQ chassis: 01

9. Other conditions

9.1. Documentation requirement

The following documentations should be provided (one set of each in English)

9.1.1 Operation manual

9.1.2 Software instruction manual

9.1.3 Maintenance, troubleshooting and safety guidelines manual

9.1.4 Manuals to handle accessories and guidelines

9.1.5 Process Parameters data for common engineering alloy feedstocks should be given in a CD/flash drive.

9.1.6 Occupational Health and Safety (OHS) guidelines and warnings.

9.2 Warranty and Annual Maintenance Contract requirements

9.2.1 A 2 year warranty should be provided from the date of installation.

9.3 Inspection, installation, commissioning and training

9.3.1 The system should be installed at IIT Madras.

9.3.2 Comprehensive training for five research fellows/students should be imparted upon installation.

9.4 Spares, consumables, mandatory accessories and standard samples

9.4.1 Bidder should offer a list of essential spare parts and accessories with their part numbers for a continuous operation for three years.

9.5 Additional mandatory conditions

9.5.1 A continuous operational support to IIT Madras should be provided without any additional cost during the warranty period (at least two years from the date of installation).

9.5.2 There should be a minimum of two visits per year by the service engineer and application engineer of the equipment supplier (preferably from OEM).

9.5.3 The total cost of the system should be inclusive of these visits.

9.5.4 The bidder must either be OEM or legal representatives of the OEM in India. The bidder and the legal representatives should have ISO certification for quality standards (a copy of ISO certification should be attached with the technical bid).

9.5.5 The bidder should have supplied to IITs/NITs/other CFTIs/National laboratories/government organisations.

9.5.6 A global reference list as well as user list in India should be enclosed.

9.5.7 The operational status of all the equipments in India should be provided.

9.5.8 Personnel safety accessories (goggles, masks etc.) should be provided

9.5.9 Special design/provision should be made to prevent accidents while in operation.

9.5.10 "Emergency Stop" button(s) should be provided at convenient and easily accessible location.

9.5.11 Safety manuals and charts should be provided.

9.5.12 Supplier should provide safety training at the time of installation.

9.5.13 Flow diagrams and electrical line diagrams should be provided

10 A detailed compliance statement to above mentioned specifications should be provided along with technical and financial quotes.