॥ सा विद्या या विमुक्तये ॥

भारतीय प्रौद्योगिकी संस्थान धारवाड

Indian Institute of Technology Dharwad

EXPRESSION OF INTREST

No. IITDh/GA/CRF/2018-2019/05

EXPRESSION OF INTEREST (EoI) FOR PROCUREMENT

of

UNIVERSAL TESTING MACHINE-25 kN AXIAL TORSIONAL SYSTEM AS PER ANNEXURE-I

1. **Introduction**

IIT Dharwad is an Institute of National Importance created by an Act of Parliament in 2016. IIT Dharwad has been steadily establishing its operations in its transit campus. Simultaneously, the institute is employing bright young and accomplished faculty. A number of unique research and development programs are on the anvil. The institute now needs to raise the levels of the capacity with the best of the facilities and infrastructure. This will provide highly talented and accomplished faculty to pursue not only their research but also think of innovative way of introducing instructional/teaching/learning solutions to practical problem of the students.

2. **Objective**

The objective of this invitation of Expression of Interest (EoI) is to seek responses from eligible Vendors for SUPPLY, INSTALLATION, COMMISSIONING, DEMONSTRATION and TRAINING OF **UNIVERSAL TESTING MACHINE-25 kN AXIAL TORSIONAL SYSTEM AS PER ANNEXURE-I**

3. Timelines

3.1 Major activities in the procurement process will be as given below: -

Sl No	Activity	Remarks
(a)	Pre-Bid Meeting	• To clarify the issues/ queries raised by intrested firms facilitate submission of bids.
(b)	Deadline for submission of EoI	• Till 10.00 Hrs on 03/10/2018
(b)	Issue of Tender Document	• Only to the vendors who submit the response to the EoI. Link for downloading the tender document to such vendors will be sent via e-mail on 03/10/2018
(c)	Submission of Tender Documents	• Deadline for bid submission 17/10/2018, 16.30 hrs based on updated specifications and tender document
(d)	Evaluation of Technical Bids	About 3 weeks (Tentative)
(e)	Opening of Commercial Bids	• The shortlisted bidders will be intimated by e-mail the schedule of opening of the commercial bids
(f)	Award of Contract	• The selected vendor will be awarded the contract.

4. MATERIAL DESCRIPTION

UNIVERSAL TESTING MACHINE -25 kN AXIAL TORSIONAL SYSTEM as per specifications described below in Annexure-I

4.1 Annexure-I

4.1.1 Technical Specification: 25 kN Axial Torsional System

- **Feature**
  - This system shall be used to fatigue test dynamic characteristics of advance materials and composite.
  - The system shall include all components necessary for complete system operation including high stiffness frame and hydraulic actuators, digital control electronics, hydraulic service manifold, Hydraulic Power Unit, Software, Personal computer for control,
  - The system shall include fully automated control, data acquisition and analysis for high rate testing
  - All transducer ranges shall have a traceability calibration as NIST/NABL or equivalent standards.
  - The vendor should provide all technical drawings, data and catalogs for reviewing the bid proposal. If there is no published brochure and detail of drawings which describes the above system, it will be recognized by purchaser that the vendor is not qualified.

B. Specification

Load Unit Assembly

Axial-Torsional Load Frame 1

- It shall be a freestanding, self-supporting unit requiring no special foundation.
- Two column design with 75 mm or above solid column
- Nominal dynamic load rating: ±25 kN or higher, fatigue rated.
- Moveable crosshead.
- Nominal frame stiffness of axial 3.40 x 10^8 N/m or higher
- Column spacing : 400 mm or higher
- Test space: Height 700mm or above
- Crosshead hydraulic lifts and controls.
- Crosshead hydraulic locks and controls.
- Elastomeric isolation mounts

Hydraulic Actuators 1

- Integrated Actuator into load frame baseplate. – bolt-on actuator in the baseplate is unacceptable
- Nominal dynamic force rating: Axial ±25 kN and Torsional ±250 N-m or higher
- Dynamic force rating must be more than 90% of static force for generating optimist ic dynamic performance
- Displacement: Axial 100 mm or above and Torsional rotation of 270° or longer
- Coaxially mounted full stroke linear variable displacement transducer (LVDT) for measurement and/or control of actuator displacement.

- Internal threads in the piston rod for mounting a grip or a load cell.
- Direct Actuator Porting without the need for flanges or manifolds.

Hydraulic Servo valve and Service Manifold 1

- Axial servo valve less than 40 lpm and Torsional servo valve less than 10 lpm
- At least Four port should be provided
- Maximum operating pressure: 210 bar
- Operating temperature: -40°C to +135°C
- Rated full-flow input signal current: 25 mA or above
- Off/Low/High pressure control.
- Fast emergency unload for system depressurization.
- Optional pilot pressure shall be provided.
- During test setup like as specimen installation, the actuator should be moved in position control

Load Transducer..... 1

- Fatigue rated at ±25 kN axial and ±250 N-m torsional or higher
- Used for load measurement and/or control of force.
- Non-linearity: 0.3% of full scale axial or better;0.15 % of full scale for torsional
- Hysteresis: 0.15% of full scale or better
- NIST/NABL or equivalent traceable factory calibration

Digital Control Electronics

Digital Control Electronics..... 1

- Provides digital servo control, function generation, data acquisition, hydraulic control, and digital I/O.
- The controller shall be expandable maximum up to 4 channels
- DDC (Direct Digital Control) bandwidth update rate: 6 kHz or faster
- Signal conditioner data sample rate: 100kHz or faster.
- Function generation by 32 bit processor, standard haversine, square, and ramp waveforms and downloaded wave shapes.
- Computer controlled transducer limits.
- 6 uncommitted channels of digital I/O (3 in, 3out).
- Automated dynamic control mode switching between any connected transducer. Any connected transducer or calculation can be selected for control (typically load, strain or displacement) including load limited displacement during specimen loading.
- 3 Computer-selectable channels of 16 bit resolution analog output for easy access to transducer signals and other critical parameters.
- Ability to save and restore PID tuning settings
- Adaptive controls compensation: Peak-Valley and Null Pacing
- Cables for hydraulic control, servo valves, conditioners, and communications to personal computer.
- It should be connected with high-speed serial interface with personal computer. It's not acceptable any parallel interface.
- It shall be provided programmable libraries for specifically designed for real time control of system compatible with general language and software like C++ etc.
- Compatible System cables

Digital Universal Conditioner. 2

- The conditioner shall be support transducers.
- DC transducer calibration data is portable between conditioners to maximize flexibility and utility of the controller and transducer resources.
- Conditioners interface to DC or AC transducers and eliminate the need for separate conditioner types.

Valve Driver/Digital Universal Conditioner Card 2

- VD/DUC mezzanine card shall be configured to drive a two-stage valve and condition a transducer, or to drive a three-stage valve.

Additional Analog Input Package 1

- Provides set of 8 auxiliary input channels for high level (+/- 10V) analog signals which can be used for control and data acquisition.
- Includes adapter supporting BNC connectors

Handset 1

- Provides ability to adjust actuators, auto-offset signals, start/stop test, turn hydraulics on/off.

Digital Transducer Interface Card 1

- Compatible Eurotherm temperature controllers, or two encoders or other digital transducers, Handset.

System Software..... 1

- Provides a software interface for configuring the controller and the user interface to the test station.
- The user can enter and save user preferences(units, valve adjustments, loop tuning) for recall at any time.
- Includes a two channel on line data display (X vs. Y or Time vs. YY), digital displays, and a system exerciser for setting up tuning parameters and warming up the system prior to testing.
- Provides an easy program for simple monotonic and cycle test execution including data acquisition.
- Test data may be stored in choice of ASCII, or Excel formats for analysis with your favorite tools.
- Null pacing adaptive control algorithm for use with ramp command signals
- Adaptive phase and amplitude algorithm for use with sine wave command signals including constant sine and blocks of sine.
- Performs amplitude control to ensure desired amplitudes are achieved.
- Data acquisition (timed, P/V, Level Crossing, Cyclic/Logarithmic)
- Function generation up to 600 Hz on all channels
- Sine, square, triangle, ramp, hold, processes, and ability to play digitized profiles
- Soft start/stop available on all channels

- Should include Amplitude Phase Control S/W to adjust the amplitude and phase of the command to realize the desired feedback signal.
- Access to test status information from any web-enabled, internet-connected device
- Alerts - Allow for email, text message or Tweet notification to interested parties when the state of a test changes
- Security - Data transfers use SSL/TLS 256-bit encryption
- User Access Control - Provides ability to create individual passwords for a page, or limit access to specific users

General Application software..... 1

- Application software shall be included for generating and executing tests. The application software will include the ability to control or to capture data from any installed AC or DC transducer, or externally conditioned transducer.
- The application software shall allow the following kinds of tests to be defined and executed.
  - monotonic tests including tensile, compression, and flexure
  - block loading fatigue
  - constant amplitude fatigue
  - random fatigue using an input file to define end levels and rates any of the above in combination.
- The application software will allow data to be collected and stored to disk during any simple or complex test. Available data acquisition routines will include timed data collection, peak/valley data collection, maximum / minimum value collection, and level crossing data collection. The software will allow selection of the master channel to be used for peak/valley and level crossing data acquisition and the additional slave channels to be collected simultaneously. Any or all internal or externally conditioned channels can be used as the master or as the slave channel. More than one data acquisition routine can be running simultaneously.
- The application software shall allow the operator to directly interact with the progress of the test through user definable software buttons. The operator can define software buttons with names and descriptions that when clicked with the mouse causes the test program to sequence to the next desired test sequence.
- The application software shall allow the operator to set up command segment end levels that are from a different transducer channel than the channel being used for test control. The end level or "data limit" can be set up to terminate the current segment when the data limit is approached from below, above, or either direction. The data limits can also be used to trigger data acquisition and other definable test system processes. Data limits can be set up to cause the test system to go to any definable state upon detection.
- The application software shall allow detection of digital inputs to the test system controller and allow digital output signals to be output from one of the control system digital output channels
- The application software shall have a detector watching for changes in peak / valley readings. The process can be used to trigger data collection or other definable test system processes.
- The application software shall allow the operator to selectively acquire data periodically as defined by logarithms, linear intervals or user selected intervals. This data shall be collected in time, level crossing or peak and valley samples.
- The application software shall allow a virtually unlimited number of test procedures to be set up and stored.
- When used with a specific temperature controller and environmental chamber, the application software shall allow the operator to set up temperature end levels and soak times and perform specific test procedures upon arrival of stable temperature.
- The software must be suitable for high rate testing.

Fatigue Analyzer Software..... 1

- The application software should allow:
  - History charts
  - Hysteresis charts
  - Failure cycle charts
  - Creation of variables
  - Calculations based on variables

Personal Computer for Control 1

- Processor: 64 bit
- 8GB RAM Memory
- 2 x 500GB Hard Drive
- 23 inch Flat-Panel Monitor, expanded keyboard, mouse.
- Windows 10 or higher

Uninterruptible Power Supply 1

- For increased safety, an acceptable Uninterruptible Power Supply (UPS) should be properly integrated in hydraulic test systems. The UPS should be wired to provide power to the servo controller and any peripheral equipment that is instrumental in safe system operation and shut-down.

Compatible Hydraulic Hose Set (pressure return & drain) should be provided (
The HPU should be close to actuator)..... 1

Hydraulic Grip and Accessories

Axial-Torsional Hydraulic Wedge Grip..... 1

- Dynamic force capacity : ±25 kN axial and ±250 N-m in torsion
- Adjustable gripping pressure to accommodate variety of specimen materials
- Control pressure from 1 to 21 MPa
- Flat specimen wedge of diamond surface: 25 mm or above wide, 1 ~ 14 mm thickness
- Round specimen wedge of serrated surface: 25 mm or above wide, 3 ~ 14 mm diameter
- Attachment kits shall be included to assemble grips to the load-cell and actuator.

Axial Extensometer..... 1

- Gage Length: 25 mm
- Travel: +5 / -2.5 mm
- Strain Range: +20% / -10%
- It should be meet ASTM E83 Class B1 and ISO 9513 Class 0.5 Stan
  dard
- NIST/NABL or equivalent traceable factory calibration
- Self-identification capabilities adopted IEEE 1451.4 standard.

Hydraulic Power Unit 1

- Variable-volume pump.
- Flow Rated, 60 lpm or higher
- 210 bar pressure, and 230 VAC, 50 Hz, 3 phase power
- Direct-coupled submerged motor should be provided.
- Nominal noise rating of 63 dB(A) or less measured at 3 feet with the pump operating at high pressure and dumping the full flow over the relief valve.
- Corrosion resistant stainless steel oil to water heat exchanger to dissipate all heat generated by the power unit.
- Submersed pump/motor design to eliminate the release of ambient heat.
- Temperature controlled water-saver and water shut-off valves to minimize water consumption.

- Cabinet with lockable cover to reduce noise and to prevent tampering of controls.
- Full flow 3-micron absolute filter in the return line to provide excellent oil cleaning.
- Integrated reservoir, pump/motor, heat exchanger, design to restrict the release of oil from seal s and fittings.
- Approved electrical disconnect interrupts power to the unit when the door is opened.
- Interlock circuitry for over-temperature and low-fluid level protection.
- Switches for start, low/high pressure, and stop shall be located on the front panel of the enclosure.
- Components prone to nuisance leakage shall be located within the reservoir to eliminate the possible release of oil.
- High quality face seal fittings minimize the potential for leakage outside of the reservoir.
- Indicators for power on, low oil level, over temperature, and dirty filter warnings shall be placed on the starter enclosure door for at-a-glance monitoring.

C. Remark

- Supplier's engineer shall provide installation support and check-out service.
- On-line system manuals on the CD.
- Warranty of 3 years and an extended AMC for 5 years (Please quote the rate separately).
- The supplier must be ISO 9000 series certificated
- Relocation of the offered System: Bidder has to stand guarantee for the relocation of the equipment whenever the permanent campus is ready. The scope includes dismantling at the transit campus and re-installation on the permanent campus. The separate quote to be provided for the relocation.
- Two set of required spares Kit for the above quoted system such as HPU Filters, Actuator Seals, Load-frame Crosshead seal kit.

DETAILS OF PRE-BID MEETING

To clarify the issues/queries raised by intrested firms and to facilitate in submission of bids, the pre-bid meeting would be held as follows:

Place	Time	Date
Board Room, Admin Building, IIT Dharwad	14.00 hrs	03/10/2018

PROCEDURE FOR SUBMISSION OF RESPONSE TO THE EoI

The response to the EoI should reach IIT Dharwad on or before 03/10/2018 by 10.00 hrs on the following address:

The Officer on Special Duty
(Admin, Finance & Contracts)
P.B. Road, Near High Court, Dharwad-580011

Or can be forwarded by e-mail at pro@iitdh.ac.in on or before 03/10/2018 by 10.00 hrs.

For any queries, you may reach us at 0836-2212839

Please acknowledge the receipt of this invitation for EoI

Sd/-
Officer on Special Duty
(Admin, Finance & Contracts)
IIT Dharwad