

Invitation for Expression of Interest (EOI)
From
Indian Institute of Science (IISc)
For
Supply and Integration of Fatigue Tension
Torsion Test Rig with Corrosion Box and Data
Acquisition System

Bid Schedule

1	Tender No	EOI/COR-RIG-AE/2026/01
2	Tender Date	September 3, 2026
3	Item Description	Corrosion Rig
4	Tender Type	EOI
5	Place of EOI document submission	Department Engineering Indian Institute of Science (IISc), Malleswaram, Bangalore - 560012 Karnataka, INDIA.
6	Last Date & Time for submission of tender	September 24, 2026, by 5pm IST
7	For further clarification	Professor Gopalakrishnan Srinivasan krishnan@iisc.ac.in Department of Aerospace Engineering Indian Institute of Science, Bangalore, 560012

Background:

The Indian Institute of Science (IISc) invites an expression of interest from domestic organizations to participate in a project to supply and integrate a **Combined Tension-Torsion Fatigue Test Rig with Corrosion box attachment along with the appropriate Data Acquisition System**. The IISc is looking for an industry partner who will support IISc in designing and manufacturing such a test rig.

Through this Expression of Interest (EOI), IISc invites applications from eligible and capable companies/technology partners interested in collaborating on the **development, implementation, integration, and long-term support** of this initiative.

This will be a single-stage participation where the documentations submitted by the short-listed organizations will be evaluated and a single organization will be selected.

Eligibility Criteria

a. Company Profile:

- The applicant must be a company, partnership firm, or LLP registered in India under the applicable laws (e.g., Indian Companies Act, 1956/2013; Partnership Act, 1932).
- The organization must have a registered office in Bengaluru, India.
- Must travel to IISc for frequent Monitoring
- The organization, if it is a startup, must have DPIIT recognition.
- The organization should provide constant support in integration in rig.

b. Experience:

- The organization must have a minimum of 3 years of experience (as of August 31, 2026) in supplying and successful installation of low cycle fatigue machines to academic institutions, government bodies, public sector units, or allied agencies.

c. Past Assignments:

- The organization must have supplied and successfully integrated low cycle fatigue machines to educational institute or government organizations.
- Minimum of 5 purchase orders for the above item must be attached.
- Patents are desirable if any. If yes patent number must be mentioned.

d. Financial Capability:

The applicant must have achieved a minimum annual revenue of INR 1 crore in each of the last three financial years.

e. Intellectual Property:

The applicant on his selection will have to sign a Non-Disclosure Agreement (NDA), which will include IP clauses as per the IP policy of the IISc

f. Declaration of Transparency:

The applicant must not be under any declaration of ineligibility for corrupt or fraudulent practices issued by the Government of India or any State Government. A self-declaration must be submitted as per the format provided in Annexure.

Project Details:

1. Purpose and Application, Regulatory Compliance and Reference Standards

The test rig development in question has three components, namely

1. Tension-Torsion test rig:

This specification formalizes the torsional channel of Tension-Torsion Test Rig in the same closed-form framework that governs the axial channel. The objective is to demonstrate by explicit numerical derivation that the rotary stroke, motor torque, machine torsional stiffness, rotary-seal friction, and shear strain measurement are adequate for: (a) quasi-static torsion to fracture under angular control; (b) shear-strain-controlled fatigue per ASTM E2207 and E606; and (c) combined tension–torsion biaxial loading per ASTM E2207.

Table — Torsional Channel Sizing Verification.

Design Requirement	Calculated Demand	Specification	Verdict
Max angular stroke ($\gamma_a = 2.0$ %, elastic)	28.3°	$\pm 540^\circ$	19× ✓
Max angular stroke (fracture, ductile steel)	159°	$\pm 540^\circ$	3.4× ✓
Peak motor torque	48.0 N·m	500 N·m cont.	10.4× ✓
Peak motor speed (50 Hz, 0.1 % γ_a)	73.8 rpm	3 000 rpm	40.6× ✓
Stiffness ratio $K_{\text{mach}} / K_{\text{spec}}$	5.96	≥ 1.0	Stable ✓
Machine compliance vs gauge	2.30×10^{-7}	$\leq 2.47 \times 10^{-7}$	✓

Design Requirement	Calculated Demand	Specification	Verdict
Torsional amplification factor Γ_{tor}	3.131	Used in command	Verified ✓
Torsional extensometer resolution	2.0 $\mu\epsilon$	< 0.5 % of 100 $\mu\epsilon$	Adequate ✓
Rotary seal friction torque	15.2 mN·m	< 1 % T_a (full-scale)	Negligible ✓
Thermal twist offset ($\Delta T = 60^\circ\text{C}$)	0.072 %	No correction	Inherent ✓
Critical crack a_c (Mode III)	8.84 mm	Wall $t = 1.0$ mm	Wall-perf first ✓

Note that a deviation of the above standards up to 10 % is allowed

Governing Standards

ASTM E143-20 (shear modulus by torsion); ASTM A938-18 (torsion testing); ASTM E2207-15 (axial-torsional fatigue, tubular); ASTM E2624-14 (biaxial transducer compatibility); ASTM E83 Class B-1 (extensometer); ASTM E1049-19 (rainflow, multi-axial via Wang-Brown).

2. Corrosion Box Attachment:

The Corrosion Box delivers, maintains, and monitors a controlled corrosive electrochemical environment exclusively at the gauge section of an ASTM dog-bone or dumbbell specimen while the specimen carries simultaneous mechanical load — tension, compression, torsion, or combined biaxial. Grips, load cell, and actuators remain outside the wetted zone, eliminating stray-current contamination of force, torque, and electrochemical signals.

The box should be made of Virgin-grade PTFE body (ASTM D1457), 10 mm wall, internal cavity $60 \times 20.5 \times 50$ mm. PTFE grip sleeves provide $\geq 10 \text{ M}\Omega$ isolation between specimen and machine frame.

Salient Features

- PTFE body inert to all primary electrolytes; $\geq 10 \text{ M}\Omega$ galvanic isolation.
- Dual-motion seal supports all four load modes under sealed corrosion.
- Five concurrent species subsystems: preparation, flow, chemistry, O_2 , temperature.
- Three-electrode cell with EIS / LPR / OCP / polarization concurrent with fatigue waveform.
- The box should support 14 ports support 12 modalities

Standards

- ASTM G1, G5, G46, G49, G59, G61, G85, G106, G111; B117; D1141; D1457; F1459; E4, E8/E8M, E466, E606, E1012, E2207; ASME BPVC VIII-1; IEC 61010-1, 60529.

3. Data Acquisition System (DAQ)

This document scopes the Data Acquisition (DAQ) fixture for the horizontal corrosion-fatigue rig. The fixture instruments accelerated corrosion and corrosion-fatigue tests on ASTM flat dog-bone specimens per ASTM E8/E8M and thin-walled tubular dumbbell specimens per ASTM E2207, supporting quasi-static extension, tension-tension, tension-compression, and tension-torsion fatigue under electrolytic exposure within the 1450 mm axial envelope. The DAQ should have enough channels to support Axial-Torsion test rig, 15 ports for corrosion measurements. The DAQ should have enough free channels available for later expansion of test rig to support digital imaging. A minimum of 32 Channels may be needed. If the vendor thinks, DAQ requires more than 32, he can quote the same in the technical bid if he is selected.

2. Safety Features

The equipment shall incorporate comprehensive operational safety features: - Compliance norms will be based on as provided in the above specifications provided for 3 components along with these EOI requests

8. Accessories, Supply, and Support

Accessories

- Standard maintenance tool kit.

Supply and Services

- Supply, installation, and commissioning at IISc Bangalore.
- Prove-out trials using actual application components.
- Operator and maintenance training for a minimum of **4 working days**.

Warranty and Documentation

- Minimum **two-year warranty** from date of commissioning.
- Comprehensive documentation (hard and soft copies), including operation manuals, maintenance procedures, and preventive checklists.

EOI with all enclosures should be emailed to Professor Gopalakrishnan Srinivasan on krishnan@iisc.ac.in on or before 5 p.m. on September 24, 2026

Late submissions will not be considered.

IISc reserves the right to reject any/or all the EOIs without assigning any reasons whatsoever.

Annexure
Self-Declaration Format

Ref. No:

Date:

To,
The Registrar,
Indian Institute of Science

With reference to my/our expression of interest to IISc, it is hereby declared that I/ (name of firm) was not declared ineligible for corrupt and fraudulent practices either indefinitely or for a particular period by any Government or other agency.

I/(name of firm) also declare that there are no contractual restrictions or legal disqualifications or other obligations which will prohibit me/us from entering this bid and each and every one of the statement and particulars contained herein are correct.

Signature of the Applicant

Date:

Place:

(seal)