

NATIONAL INSTITUTE OF TECHNOLOGY

TIRUCHIRAPPALLI – 15

Department of Mechanical Engineering

Web : www.nitt.edu

Phone : 0431 - 2503400



TENDER DOCUMENT

Tender Notification No.: *NITT/F.No.:001/PLAN/2017-18/MEC/SIF*

Dated: **13.11.2017**

Name of the component : **Fatigue Testing machine**

Quantity required : **01**

EMD Amount : **Rs. 1,92,000/-**

Cost of the Tender Document : **Rs. 150/-**

Delivery : **Within 8 Weeks**

Last Date of submission of Tender : **up to 14.12.2017, 3:00 pm**

Address for submission of Tender : The Director,
National Institute of Technology- Tiruchirappalli,
Tiruchirappalli – 620015, Tamilnadu, India
Kind ATTN to: Dr. N. Siva Shanmugam, Dr. T. Ramesh
Phone: 9443649278, 9994339803
Email: nsiva@nitt.edu, tramesh@nitt.edu

Date of opening of technical bid : **14.12.2017 at 3:30 pm**



**NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI – 15**

DEPARTMENT OF MECHANICAL ENGINEERING

Tender Notification No.: *NITT/F.No.:001/PLAN/2017-18/MEC/SIF*

Dated: 13.11.2017

NOTICE INVITING TENDER

The National Institute of Technology, Tiruchirappalli (NITT) is an autonomous body under MHRD, GOI, imparting Technical Education and engaged in Research Activities. It is proposed to procure the following component for the Departmental academic/research activities.

Sealed bids under **two bid system** are invited for the following component subject to the following terms and conditions, from the reputed manufacturers or their authorized dealers so as to reach this office on or before scheduled date and time. The technical cover will be opened on the same day in the presence of bidders or their authorized agents who may choose to be present.

Name of the component	: Fatigue Testing machine
Quantity required	: 01
EMD	: Rs. 1,92,000
Cost of the Tender Document	: Rs. 150/-
Time for completion of supply after placing purchase order	: 8 Weeks
Last Date of submission of Tender	: 14.12.2017

Address for submission of Tender : The Director,
National Institute of Technology- Tiruchirappalli,
Tiruchirappalli – 620015, Tamilnadu, India
Kind ATTN to: Dr. N. Siva Shanmugam, Dr. T. Ramesh
Phone: 9443649278, 9994339803
Email: nsiva@nitt.edu, tramesh@nitt.edu

Place, Date and time of opening of bid :

Date: **14.12.2017**

Time: **3:30 P.M.**

Venue: STORES

Note : The Institute shall not be responsible for any postal delay about non-receipt / non delivery of the bids or due to wrong addressee.

INSTRUCTIONS TO BIDDERS

BIDDER'S COPY

1. This document set contains the following:
 - a) Terms and conditions of the Tender
 - b) Details of the Firm offering this Quote
 - c) Technical Compliance Form
 - d) Quotation form (Price Bid)
 - e) Currency Form (quoted on behalf of the foreign suppliers)
 - f) NIT-T's check list copy
2. The bidder's copy is for your future records. Please fill in and return only NIT-T's copy.
3. The bidder should give details of their technical soundness and provide list of customers of previous supply of similar items to Universities, Institutes or Government Departments/Undertakings/public sectors with contact details. The details of the agency/profile should be furnished along with the copy of all related documents.
4. Read through the terms and conditions given and affix your signature and seal if you find them acceptable. Any deviations may be recorded. Read carefully list of specifications that we have enclosed.
5. Fill in the questionnaire regarding the Firm.
6. The downloaded documents '**Technical Compliance Form**' and '**Quotation Form (Price Bid)**' should be **TYPE WRITTEN USING CAPITAL LETTERS ONLY**. At the time of filling the "**Quotation Form (Price Bid)**" make sure that you have not missed anything. Specify the model number & specification for each item. The form should be filled item-wise. Do not leave blank fields. If you are not quoting for a specific item, you should specify "**NOT QUOTING**".
7. **Do not use** ambiguous terms like "**yes**", "**complied**" or "**available**". Specifically mention the matching specification of the product offered by you. Make sure that you have affixed your signature with date and seal on all the documents.
8. Please send the tenders in a sealed envelope superscribed as "**QUOTATIONS AGAINST TENDER NOTIFICATION NO: *NITT/F.No.:001/PLAN/2017-18/MEC/SIF* Item No. :**" so as to reach "The Director, National Institute of Technology, Tiruchirappalli - 620 015, India" on or before **14.12.2017** at **3:00 P.M.** along with a **Softcopy of the Technical Compliance form (along with cover-2) and Quotation Forms (along with cover-3) in MS-Excel file format in a CD/DVD or USB drive.**
9. For any further clarifications, contact by E-Mail: nsiva@nitt.edu or by written request to "The Registrar, National Institute of Technology, Tiruchirappalli - 620 015, India"
10. Pre-bid conference will be held on at.....

Last Date for receipt of tender at NIT-T : **14.12.2017, up to 3:00 P.M.**

Opening Date for technical bid : **14.12.2017 at 3:30 P.M.**

CHECKLIST TO BE FILLED IN BY BIDDER	
List of documents to be enclosed	Completed & Signed
1. Terms and Conditions form	YES / NO
2. Details of the Firm offering this Quote	YES / NO
3. NIT-T's Quotation form (Technical & Price Bid)	YES / NO
4. Currency Form(quoted on behalf of the foreign suppliers)	YES / NO
5. Other technical specifications & pamphlets	YES / NO

- Note:** 1. "Cover" should contain the following:
- a. Form of "**Acceptance of Terms and Conditions**".
 - b. Form of "**Firm details**"
 - c. Pamphlets, if any (in a separate sealed cover)
 - d. Quotation Form (Technical, Price Bid and Currency Form)

Please retain this page with you for your future reference.

SECTION : 1 – TWO BID TENDER

Cover 1: EMD and Tender cost

(should be superscribed as 'EMD and tender cost cover' duly indicating the Tender reference No. and the due date of opening)

Earnest Money Deposit (EMD) and tender cost are to be submitted by way of Demand Draft/FDR drawn on any Nationalized bank in India in favor of "The Director, NIT, Trichy" payable at Trichy. The bids submitted without EMD or tender cost will be treated as non-responsive and will be rejected. EMD shall bear no interest.

Cover 2: Technical Bid

(should be superscribed as 'Technical Bid' duly indicating the Tender reference No. and the due date of opening)

Should contain:

- a. Technical pamphlets
- b. Detailed technical specification
- c. Copy of license certificate for manufacture/supply of the item*
- d. Income Tax PAN number & TIN number/GST.
- e. Last three years balance sheet approved by the CA and the IT return.*
- f. Warranty period offered for the tendered item to be specified. If the warranty period is not conforming with the schedule of requirements given in section 3 of the Tender document, the bid is liable to be treated as non-responsive and will be rejected.
- g. Duly filled up technical questionnaire, if any
- h. Duly filled up deviation schedules to technical specifications, if any
- i. Copy of supply orders completed during the last three years

* Appropriately pertaining to the country of origin.

Cover 3: Price Bid

(should be superscribed as 'Price Bid' duly indicating the Tender reference No. and the due date of opening)

Should contain:

- a. Price bid as per the format in Section-4 of the tender document
- b. Break-up price as per the format in Annexure-A

Note:

- a. If the prices are revealed in cover 1 or in cover 2, the offer will be summarily rejected.
- b. Each Cover shall be sent in a double sealed cover. The inner covers (Cover 1, Cover 2 and Cover 3) should be sealed individually with the Sellers's distinctive seal and superscribed with the tender reference No. and due date of opening. All inner covers shall be placed in a common outer cover which shall also be sealed with seller's distinctive seal and superscribed with the tender reference No. and due date of opening.
- c. Mention "Kind Attention: **Dr. N. Siva Shanmugam & Dr. T. Ramesh** and submit at the address given in the Notice Inviting Tender.
- d. Cover 1 & 2 will be opened on the scheduled date and time mentioned in the tender enquiry.
- e. Cover 3 of the technically and commercially suitable offers alone will be opened on a date which will be intimated to the qualified bidders.

SECTION : 2 – TERMS AND CONDITIONS FORM

**IMPORTANT: READ THE FOLLOWING TERMS AND CONDITIONS AND
SIGN THE ACCEPTANCE CLAUSE FOLLOWING IT**

1. The offers should be addressed to “The Director, National Institute of Technology, Tiruchirappalli 620015, India” and should be sent in a sealed envelope superscribed BID **AGAINST TENDER NOTIFICATION No.: “NITT/F.No.:001/PLAN/2017-18/MEC/SIF”** so as to reach us **on or before 14.12.2017**
2. Each offer should be sent in a sealed cover with the tender documents. Tenders received through email or FAX will not be considered. **Softcopy of the Technical Compliance form and Quotation Forms should be submitted along with the tender in MS-Excel file format in a CD/DVD or USB drive. However, if there is any dispute between Hard copy and Soft copy, Hard copy will be taken.**
3. The tenders will be opened on **14.12.2017 at 3:30 P.M.** in the presence of the vendors present with authorization letter from the respective companies / firms. Suppliers intending to attend the tender opening should intimate us in advance.
4. Full technical specifications and pamphlets should be sent along with the tenders. **Offers without proper technical specifications will be rejected.**
5. The rate quoted should be on unit basis excluding Taxes. Taxes and other charges should be quoted separately, considering exemptions if any.
6. All offers should indicate unit price (excluding taxes and duties applicable), Taxes and other charges should be mentioned separately, if any. Additional charges for packing, forwarding, freight, insurance etc., if any, should be clearly mentioned. Clearance at Customs will be arranged by us.
7. NIT-T is paying concessional Customs & Excise duty under Government of India Notification No.51/96 for Central Customs and 10/97 for Central Excise Duty vide Certificate No.TU/V/RG-CDE(183)/2011 dt.10.10.11. Currently the purchaser is paying 5% Basic Customs Duty, 2% Educational Cess on Basic Customs Duty, 1% Higher Education Cess on Educational Cess, and 4% Import Additional Duty. **The institute will pay the service tax as per GST.**
8. In case the offered items are to be imported, the rates should be quoted in foreign currency on C.I.F. Chennai Airport basis, and it should include the Freight up to Chennai airport and the insurance cover should be up to National Institute of Technology, Tiruchirappalli. NIT-T shall pay Customs duty if any.
9. If the price quoted is in foreign currency and if the order value is more than US\$10,000 and requested by the bidder then 100% payment will be made through **Letter of Credit (LC) at sight on acceptance. The bank charges outside India should be borne by the Supplier / Beneficiary. Part shipment not allowed.**
10. If the price quoted is in Indian Rupees, then 100% payment will be made only after installation and commissioning. **No advance payment will be made.**
11. No revision of the price bid will be allowed once the price bids are opened. In case of foreign currency, the agency should mention the % of currency fluctuations they can bear.
12. No increase in price will be allowed after our firm orders are placed.
13. **Payment of GST (on ultimate products)** as applicable on the closing date of tender will be to the supplier’s / contractor’s account. Any statutory variation (both plus and minus) in the rate of GST after closing date of tender/revised price bid but before the expiry of the contractual delivery / completion period will be to the account of the office.
The bidder(s) should indicate, in their bid, the amount with exact rate of the GST on ultimate finished product, as applicable at tendering stage, separately in the bid. In case the above information subsequently proves wrong, incorrect or misleading (a) this Institute will have no

liability to reimburse the excess in the difference in rates of the item under which the duty/tax assessed finally (b) this Institute will have the right to recover the difference in case the rate of duty / tax finally assessed is on the lower side. Any increase in GST during extended period of the contract / supply order will be to supplier's / contractor's account where such extension in delivery of the materials/completion of the project was on the request of supplier / contractor. However, any decrease in GST during extended period of the contract / supply order, will be to the account of this Institute.

14. **This institute will pay service tax as per GST.**
15. The warranty period should be clearly mentioned. The maintenance charges (AMC) under different schemes after the expiry of the warranty should also be mentioned.
16. Quote should come from authorized dealer or distributor or reseller for each of the product quoted. An authorization letter should accompany your quote for each product quoted; otherwise it may lead to rejection.
17. The delivery period and other terms should be clearly mentioned.
18. **Eligibility:** Quotation from registered firms/company's / manufacturer under TNGST/CST / other statutory bodies alone will be considered. Any Manufacturer / Supplier / Dealer who has been declared ineligible by World Bank/Government of India shall not be eligible to participate in this bid. Any fraudulent practices including concealing of facts at the time of submission of bid and there after shall lead to disqualification. List of beneficiaries especially from Educational Institutions / R & D Institutions should also be enclosed with the quotations.
19. For those instruments Cost exceeding Rs. 5,00,000/- the company should have (i) Three similar works, each of value not less than 40% of the estimated cost put to tender, or (ii) Two similar works, each of value not less than 50% of the estimated cost, or (iii) One similar work of value not less than 80% of the estimated cost, all amounts rounded off to a convenient full figure, in the last 7 years ending on the last day of the month previous to the one in which the tenders are invited.
20. Complete user, technical and service documentation and spare parts catalogue are to be provided along with the supply of the item.
21. The vendors are informed that they should not call us over phone or contact us in person. All clarifications can be obtained through E-Mail/FAX/Post. Vendors shall not make attempts to establish unsolicited and un-authorized contact with us after the opening of the offers and prior to the notification of the award. Any attempt by any vendor to bring to bear extraneous pressures on us shall be sufficient reason to disqualify the vendor.
22. Delay / loss in postal transit or due to other reasons will not be NIT-T's responsibility.
23. We are not responsible for accidental opening of the covers that are not properly superscribed and sealed before the time scheduled for opening.
24. The tender should be made only on the FORM which is available in our website, otherwise it shall lead to rejection. The FORM should be duly filled up (preferably **TYPE WRITTEN IN CAPITAL LETTERS**) and should clearly mention the features offered by the bidder against each specification.
25. Authorized signatory should sign on all the pages. Bids without authorized signatures or seal of the firm will be rejected.
26. The manufacturers of the quoted make of the product must be of National / International repute and having ISO /BIS certificate.
27. **Liquidated damages:** If the bidder/supplier, after accepting the Purchase Order, fails to deliver any or all of the Goods within the period specified in the Order, NIT-T shall, without prejudice to its other remedies under the Rules of Purchase, proceed to cancel the order or agree to accept a delayed delivery on the condition of payment of liquidated damages by the bidder / supplier a sum equivalent to 0.50% of the total cost as indicated in the Purchase Order (which will be deemed as agreed price) for each week or part thereof of delay until actual delivery or performance is completed and such penal charges shall be limited to a maximum of 5% of the total cost. Once the maximum is reached NIT-T may proceed on its own to consider the termination / cancellation of the order.

28. **The vendors are informed that they should sign a stamp paper agreement with us, for Warranty, AMC, etc. before placing the final purchase order as per our terms & conditions and 5% -10% of purchase order value in the form of bank guarantee towards performance security. The bank guarantee will be returned to the supplier after the successful completion of supply, installation, and the warranty period.**
29. Failure to comply with all the terms and conditions mentioned herein would result in the tender being summarily rejected.
30. Vendors are informed that once the companies are shortlisted based on the technical specification, only then the price bids of the firms that meet NIT-T's Technical specification / requirements would be compared.
31. The order will be based on the actual requirement at the time of ordering, optional items may also be ordered based on the actual requirements at the time of ordering. Not quoting for this may result in disqualification.
32. NIT-T reserves the right to modify or alter the specifications after short listing of tenderers.
33. NIT-T reserves the right to change the order quantity or split the orders among multiple vendors without assigning any reason(s) whatsoever.
34. NIT-T reserves the right to reject any or all the tenders without assigning any reasons whatsoever.
35. NIT-T reserves the right to purchase decreased number of quantity of the item to be purchased.
36. The agencies should submit their rate as per the format given in Section 4 of the Notice Inviting Tender in this cover. All the pages of the bid should be signed affixing the seal. All corrections and overwriting should be initialed.
37. The tender will be acceptable only from the manufacturers or its authorized supplier.
38. The bid shall be in the format of price schedule given in Section 4. The contract form as per format given in section 5 shall be submitted. Incomplete or conditional tender will be rejected.
39. Details of quantity and the specifications are mentioned in Section 3 appended to this Notice Inviting Tender.
40. The item to be used is strictly according to the specification and subject to test by the Institute/concerned authorities. It must be delivered and installed in good working condition.
41. The Contractor/Supplier shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the work/supply in full but he did not derive in consequence of the foreclosure of the whole or part of the works.
42. In case of dispute, the matter will be subject to Tiruchirappalli, Tamil Nadu Jurisdiction only.

Release of EMD: The EMD will be released after receipt of performance security from successful bidder.

Validity of bids: The rate quote should be valid for a minimum of 120 days. No claim for escalation of rate will be considered after opening the Tender.

Imports: In case, goods are to be imported, the Indian agent should furnish authorization certificate by the principles abroad for submission of the bid in response to this Notice Inviting Tender.

Clarification of Tender Document: A prospective bidder requiring any clarification of the Tender document may communicate to the contact person given in this notice inviting tender.

Amendment of tender document: At any time prior to the last date of receipt of bids, Institute may for any reason, whether at its own initiative or in response to a clarification requested by prospective bidder, modify the Tender document by an amendment.

The Institute may at its own discretion extend the last date for the receipt of bids.

The bids shall be written in English language and any information printed in other language shall be accompanied by an English translation, in which case for the purpose of interpretation of the bid, the English translation shall govern.

The Institute reserves the right of accepting any bid other than the lowest or even rejecting all the bids without assigning any reasons therefor. The decision of the Institute Purchase Committee is final in all matters of tender and purchase.

The bidder should give the following declaration while submitting the Tender.

ACCEPTANCE

We accept the above terms and conditions and shall comply with them strictly.

NAME OF THE VENDOR:

ADDRESS :

Signature and seal

“DETAILS OF THE FIRM OFFERING THIS QUOTE”
(Write or print or type in block letters)

1. Name of the firm: _____
2. Date of incorporation: _____
2. Nature of the company (tick one): Government / Public / Private Company / Partnership / Proprietorship
3. Specify the number of years in this line of activity by the Company: ..
4. Quantity of sales in the last three years for the “.....” (same model that you have quoted):

2014-2015	2015-2016	2016-2017

5. Turnover in the last three years (Lakh Indian Rupees):

2014-2015	2015-2016	2016-2017

6. Provide the postal address, telephone & fax numbers, and email address of the nearest service center.
7. Number of service engineers in the above location trained on the product quoted along with their educational qualification, certification and designation (applicable only for instruments):
8. Assured response time for service calls in hours:
9. Delivery period from the date an official purchase order placed (in weeks):
10. Enclose the list of customers to whom you have supplied “Fatigue Testing Machine.” during the last 3 years ending 31/03/2017 with full postal address and name of the contact person with phone, FAX numbers, and E-Mail id. Certificate regarding satisfactory performance of the “.....” from the minimum three end users should be furnished.
11. Are you the authorized dealer or distributor or reseller for the products quoted?
12. Have you supplied “.....” to National Institute of Technology, Tiruchirappalli in the last 3 years? If yes, specify the quantity supplied in the last 3 years and last PO reference:
13. Was there any elapse or delay in supplying the goods ordered or any service related issue during the warranty period for the products ordered by NIT-T with your firm? If yes, provide details.
14. On Manufacturer’s Side to whom NITT have to contact in case of delayed in supply and other issues committed by the authorized dealer / distributor / reseller :

Contact Person Name :	
Address :	
E-mail ID :	Telephone / Cell Phone :

DECLARATION

I/we have not tampered/modified the tender forms in any manner. In case, if the same is found to be tampered/modified, I/we understand that my/our tender will be summarily rejected and full Earnest Money Deposit (EMD) will be forfeited and I/we am/are liable to be banned from doing business with NIT, Trichy and /or prosecuted.

Signature of the Bidder :

Name and Designation :

Business Address :

.....

.....

Place :

Date :

Seal of the Bidder's Firm

SECTION : 3 – SCHEDULE OF REQUIREMENTS, SPECIFICATIONS AND ALLIED DETAILS
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Specification for Fatigue Testing machine

Name of the Component to be procured: **Fatigue Testing machine**

Specification

1. Load Frame:

- 1.1. Two Column Load Frame: maximum capacity $\pm 100\text{kN}$
- 1.2. Frame stiffness: 390 kN/mm
- 1.3. Column spacing: more than 560 mm
- 1.4. Column diameter: more than 70 mm
- 1.5. Maximum day light between crosshead to platen above 1500mm
- 1.6. The frame should have hydraulic Lift and Hydraulic Clamp. The Hydraulic Clamp should be active clamping meaning the clamp cylinder should be pressurized during clamping.

2. Actuator:

- 2.1. Type of Actuator: Servo Hydraulic Hydrostatic Bearing Actuator
- 2.2. Actuator Stroke: 150mm (± 75 mm).
- 2.3. The actuator should be platen mounted.

3. Load Cell

- 3.1. Dynamic Load Cell $\pm 100\text{kN}$
- 3.2. Load Cell should be with Built in Accelerometer for Inertia Compensation.
- 3.3. Fatigue life of minimum 10^8 and above full stress reversed cycles at full load capacity.
- 3.4. 300% Overload Capacity before mechanical failure
- 3.5. Side load resistance of 40% of full load capacity
- 3.6. Automatic Calibration and balance facility is required when fitted to the machine.
- 3.7. Repeatability: Better than $\pm 0.25\%$ of reading from 1% to 100% of load cell reading.
- 3.8. Linearity: Better than $\pm 0.25\%$ of reading from 1% to 100% of load cell reading.
- 3.9. Load cell accuracy 0.5% of load cell reading
- 3.10. Calibration of load cell must meet the requirements of ISO7500-1 Class 0.5, ASTM E4, EN10002-2 Class 0.5 and JIS (B7721, B7733) (**any three**).

4. Electronic Controller

4.1. General

- 4.1.1. The test system shall be controlled by a fully digital, closed-loop control system based on double precision floating point 64 Bit architecture. Analogue control systems, even if digitally supervised, or bought in from a 3rd party supplier are not acceptable. The system must feature a digital control system capable of controlling the actuator in position, load, and strain modes. **Analogue control systems, even if digitally supervised, are not acceptable.**

- 4.1.2. The system must allow up to two control loops to be run simultaneously without degradation in performance. Thus the control system must be capable of controlling 2 actuators simultaneously.
- 4.1.3. The control loop must feature waveform generation of 32bit resolution, with a minimum loop closure rate of 10kHz or higher across all control axes regardless of how many axes are being used.
- 4.1.4. The controller must feature a facility for automatically updating the control loop terms in order to compensate for changes in specimen stiffness during a cycle. This facility must run at a minimum of 1kHz.
- 4.1.5. Channels for linear position and axial load must be included and must feature 19 bit resolution, with a minimum of 1kHz bandwidth, across the full range of the transducer or 24-bit (1 Hz Bandwidth via a Digital Readout)
- 4.1.6. The controller should have at least a 3 term control loops (i.e. P, I, D).
- 4.1.7. The linear position, axial load and two sensor conditioning channels (e.g. strain) should be available for control and data acquisition.
- 4.1.8. Up to eight channels must be available for data acquisition through the use of sensor conditioning channels.
- 4.1.9. Data from all control and acquisition channels should be recorded simultaneously and synchronously and should be capable of being logged at sample rates of up to and including 10kHz across all channels, irrespective of how many channels are used.
- 4.1.10. The digital controller must have at least one analogue input for an external analogue waveform drive signal, and with at least four assignable analogue outputs (graphical).
- 4.1.11. All supplied transducers shall be automatically recognized and calibrated by the controller.
- 4.1.12. The controller must prevent the use of any uncalibrated transducer to avoid unvalidated data being gathered.
- 4.1.13. The controller must have a minimum of two limit detectors per connected transducer and must have a detection time of 1ms or better. The limit detectors should send suitable signal to the attached PC when actuated.
- 4.1.14. The controller must incorporate a watchdog protocol to detect loss of communication with the personal computer. In the event of any communications loss, the controller must stop testing and revert to a safe state.
- 4.1.15. The control system must have STIFFNESS BASED AUTO-TUNING (the system should run a simple ramp and able to set PID Values for all the transducer in a single step).
- 4.1.16. The control system must have a feature to ensure the load is kept within a predefined range during test set up and specimen loading. The minimum load is to be 0.2% of the maximum load or lower.
- 4.1.17. It must be possible to run tests either by means of a manual hardware based control panel, or through application programs running on a PC.
- 4.1.18. The controller must provide control of the hydraulic power supply from the loadframe. The controller will monitor the hydraulic power supply's (HPS) safety features and must shut down the machine in the event of a HPS fault.
- 4.1.19. The hydraulic grip should be electronically controlled. The controller must maintain the gripping force while a test is running.
- 4.1.20. A handset should be provided with push buttons for coarse actuator position and a thumbwheel for fine actuator positioning.
- 4.1.21. The frequency of the waveform generator must be 0.00001Hz to 1kHz or greater
- 4.1.22. The control loop update rate must be 10 kHz or better.

- 4.1.23. The controller must feature a facility for automatically updating the control loop terms in order to compensate for changes in specimen stiffness during a cycle. This facility must run at a minimum of 1kHz. (Adaptive Control)
- 4.1.24. Signal conditioners should be of fully digital type using advanced Digital Signal Processing (DSP) techniques **not conventional ADC, with 40 kHz sampling rate.**
- 4.1.25. Position (stroke) accuracy must be $\pm 0.5\%$ of transducer full scale or better.
- 4.1.26. Load accuracy must be $\pm 0.005\%$ of full scale, or 0.5% of reading, whichever is better. Calibration must meet the requirements of ISO7500-1 Class 0.5, ASTM E4, EN10002-2 Class 0.5 and JIS (B7721, B7733) **(any three).**
- 4.1.27. Strain accuracy must be $\pm 0.005\%$ of full scale or 0.25% of reading, whichever is better. Calibration must meet the requirements of ISO9513 Class 0.5, 1, 2, ASTM E83 Class B1, B2, C, D, EN10002-4 Class 0.5, 1, 2 and JIS7741 Grade 0.5, 1, 2 - **(any three).**
- 4.1.28. For systems with hydraulic crosshead clamping, the controller must detect unclamped state and must revert to a safe mode.
- 4.1.29. All control knobs and switches must be ergonomically located.

4.2. **Computer Interface**

- 4.2.1. The controller must feature a high-speed, industry standard Ethernet computer interface, capable of handling all control signals and data acquisition.
- 4.2.2. The controller must feature a watchdog to detect loss of communication with the personal computer. If communication fails, the system must shut down.

5. **Hydraulic Power pack**

- 5.1. Hydraulic power pack of nominal oil flow capacity of 45lpm or higher at 415AC, 50Hz.
- 5.2. Maximum Output pressure of 210 Bar.
- 5.3. Tank capacity: 225 Litres or Higher.
- 5.4. PLC Operator interface with digital display for oil pressure and oil temperature.
- 5.5. High efficiency plate heat exchanger
- 5.6. Should include protection device for oil temperature, oil pressure, oil level, oil filter condition and motor temperature.
- 5.7. Remote and Local start/stop functionality.
- 5.8. Hydraulic pump should be of variable flow type.

6. **Computer:**

- 6.1 A high end Personal Computer with windows 10 based Operating System should be supplied **with following configurations along with the machine.**
 Intel(R) Core (TM) i7, 3.20 GHz, 8GB DDR3, 500 GB Hard Drive (7,200rpm)
 Intel HD Graphic card, Internal Speaker, 1 x Integrated 10/100/1000 Ethernet Port, 1 x Ethernet PCI-E Network Card, 3 PCI Slots (2 full length, 1 short length), 1 free PCI Express Slots, 19in Flat Panel Monitor, Microsoft Windows 10 32/64 operating system and MS office.

7. **Software System:**

7.1. **Static Test Application Package**

- 7.1.1. The software should be MS-WINDOWS 10 compatible and should run on high end PC. Complete machine control and analysis of data should be through software for all kinds of static testing with Block Programming. **The software should have following features.**
- 7.1.2. User Specified working Screen layout for specimen dimension input, Graphical representation and Result table in one single screen.

- 7.1.3. Standardized Test Method Template for all testing standards.
- 7.1.4. Intelligent data logging with programmable time base, load, strain, stress and derived channels.
- 7.1.5. Capability with Microsoft office products.
- 7.1.6. User defined Report Templates with features of WYSIWYG (What You See Is What You Get), Exportable to Microsoft word, Adobe Acrobat and to HTML format.
- 7.1.7. Selectable mode: Prompted Testing sequence for Speed and Efficiency and Free-Form Testing for maximum Flexibility.
- 7.1.8. On-line, context sensitive help and reference system with hypergraphics.
- 7.1.9. The software should have facility for minimum two simultaneous runtime graphs to illustrate different characteristics.
- 7.1.10. The software should have capability for producing Multi channels graphs.
- 7.1.11. The software should have Auto scale plotting in real time graphs.
- 7.1.12. The software should have capability for single click zoom in and zoom out.
- 7.1.13. The software should have facility for selectable scales for linear and Logarithmic scale.
- 7.1.14. The software should have facility to export user defined test raw data and final test result in CSV, ASCII format and to Microsoft Access.
- 7.1.15. The software should have facility to reanalyse the test data of already tested samples in future.
- 7.1.16. The system and software should have facility to video capture of the test.
- 7.1.17. The software should be supplied with Product Tutor and manuals.

7.2. **Fatigue Test Software:**

- 7.2.1. Fatigue Testing Software should provide user to define and run tests, and to acquire data for a wide range of dynamic and quasi-static applications. Tests can range from simple single-axis ramps and repetitive waveforms, to more complex multi-axis and multi-step tests.
- 7.2.2. Test methods should be quickly and easily constructed using a series of steps within a matrix structure, allowing the user full control over waveform shape, control mode, data logging and test progress. Completely independent waveforms can be performed on each axis for systems with multiple axes of control.
- 7.2.3. During the test a range of comprehensive data logging and data reduction tools should be available to enable the user to acquire the required data and at the same time minimize data file size through intelligent data reduction features. Test should be able to configure the Live Test Workspace to show up to four real time graphs and add progress or status indicators.
- 7.2.4. Test results should be automatically grouped together within a logical project structure allowing quick access to the data files and batch transfer of results. To aid results tracking a read-only copy of the test method should be stored with the test results.
- 7.2.5. Up to a maximum of 24 channels of control or acquisition
- 7.2.6. Capable of 1ms inter block transfer time from one step in the sequence to the next
- 7.2.7. Trend monitoring function - a change in max, min, mean or amplitude from a user defined reference cycle should be used to control test flow or end test
- 7.2.8. Amplitude control to correct for peak errors in a cyclic waveform
- 7.2.9. waveform types like sine, triangle, square, holds, ramps, trapezoidal, user defined turn points files and sample data playback are to be supported

- 7.2.10. Mixed mode control on cyclic waveforms with Control of one Channel and controlling other parameters should be supported (Ex: with Mean Load of 4kN and amplitude of ± 2 mm).
- 7.2.11. Software should have ability to automatically balance extensometers and derived position channels at any stage of the test
- 7.2.12. The software should have facility to draw up to four real time graphs - X-Y, Double Y, Trend, Multi-channel and chart recorder
- 7.2.13. Extensive data logging per cycle data (max /min /amplitude /mean level), full hysteresis data, or both combined at linear and logarithmic type should be supported.
- 7.2.14. Data storage to computer disk should be stored in ASCII format at rates up to 5kHz or 10kHz synchronous on all channels
- 7.2.15. The software should have ability to pause and resume a test, either immediately or at some point in the future
- 7.2.16. Software should have control of digital and analogue outputs, waveform start and stop enveloping.

8. Grips & Fixtures:

- 8.1. Fatigue rated Hydraulic Wedge grip of ± 100 kN capacity is required for the test conducting for both flat & round specimens.
- 8.2. For flat specimens: thickness to be measured is from 0 to 15mm for 50mm wide samples.
- 8.3. For round specimens: the diameter should be 6 to 16 mm.
- 8.4. Digital Grip controller is required for operation of the grip.
- 8.5. The system should be capable of fixing the compression platen, 3 point bend fixture, etc. without removing the hydraulic wedge grips from the frame.

9. 3-Point Bend Fixture should have following:

Fatigue Rated 3 Point Bend Fixture, 100 kN Dynamic Capacity with 25mm Diameter Rollers.
 Adjustable lower span from 30 to 250mm.
 Maximum specimen width of 50mm
 Anti-rotation to be incorporated in the design
 Provision to incorporate the dwell time (0-100s)

10. Compression Fixture:

150 mm Diameter Fatigue Rated Compression Platens
 Special fixtures should be supplied for conducting shear test

11. Extensometry System:

11.1. Dynamic Extensometer:

Dynamic Strain gauge extensometer is required for testing of samples for direct strain measurement and closed loop strain control, suitable for tensile, compressive & fatigue testing.

The extensometer should have a 12.5mm gauge length with a travel of ± 2.5 mm giving $\pm 20\%$ strain. It includes a 12.5mm extender to give a gauge length of 25mm and $\pm 10\%$ strain and a 37.5mm extender to give a gauge length of 50mm and strain of $\pm 5\%$ strain.

Optional

- Suitable cooling tower for hydraulic power unit.
- Suitable UPS for electronic controller and high end PC system.

ESSENTIAL REQUIREMENTS

Tenderers to submit point wise compliance to the specification and indicate for any deviations

The tender will be rejected if the following information is not included in the technical bid

- The manufacturer should have ISO 9001 certificate
- The firm should have adequate number (at least 5) of such systems currently in operation for more than 5 years, in the country. Manufacturer should furnish the details addresses of such establishments where they have supplied similar equipment's and running successful for more than 5 years.
- The firm should be equipped with well-trained engineers to offer post warranty maintenance and service support.
- Details of service support in India that the firm can offer should be given along with the NABL Calibration facility.
- **Nearest service center to Trichy to be mentioned.**
- **Agent should have Exclusive agency for last 5 years or more is mandatory. Copy of certificate for such exclusive agency is mandatory.**
- **Test certificates for all load cells and transducers should be provided.**

Quantity : 01

Any other details/requirement:

Warranty period required (years): 1 Year

Delivery schedule expected after
release of purchase order (in weeks) : 8 Weeks

EMD (in Rupees) : Rs.1,92,000/-

Performance Security to be given by the successful
bidder after release of purchase order (in Rupees) : **10%** of the total order cost

SECTION : 4 – PRICE SCHEDULE

To be used by the bidder for submission of the price bid

- 1. Component Name: **Fatigue Testing machine**

- 2. Specifications (confirming to Section 3 of Tender document-enclose additional sheets if necessary):

- 3. Currency and Unit cost (excluding Taxes):

- 4. Quantity:

- 5. Item cost (Sl.No.3 * Sl.No.4) (in Indian Rupee):

- 6. Taxes and other charges:
 - (i) Specify the type of taxes and duties in percentages and also in figures
 - (ii) Specify other charges in figures

- 7. Total cost (Inclusive of all taxes) :

- 8. Warranty period (confirming to the Section 3 of Tender document. This should be mentioned in Technical bid also in order to get qualified for price bid):

- 9. Delivery Schedule (confirming to the Section 3 of Tender document):

- 10. Name and address of the firm for placing purchase order:

- 11. Name and address of Indian authorized agent (in case of imports only):

Signature of the Bidder :

Name and Designation :

Business Address :

Place :

Date : **Seal of the Bidder's Firm**

(Note: All column should be filled. No column should be left blank. If any column is not filled-in properly or left empty then the bid will be rejected.)

SECTION : 5 – CONTRACT FORM

To be provided by the bidder in their business letter head

[Name of the Supplier’s Firm] hereby abide to deliver theby the delivery schedule mentioned in the Section 3 of the Tender document for supply of the items if the purchase order is awarded.

The item will be supplied conforming to the specifications stated in the tender document without any defect and deviations.

Warranty will be given for the period mentioned in the tender document and service will be rendered to the satisfaction of NIT, Trichy during this period.

Signature of the Bidder :

Name and Designation :

Business Address :

Place :

Date :

Seal of the Bidder’s Firm

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPALLI

Annexure-A

MODEL PRICE BID FORMAT FOR INDIAN BIDDERS

Tender No. & Date:

Bidder's Offer No. & Date:

S. No.	Description of item	Unit (SET /No)	QTY	Rate /Qty in Rs. (excluding of all taxes)	GST			Total Value in Rs. (inclusive of all taxes)
					SGST %	CGST %	IGST %	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Supply portion (The price indicated shall be exclusive of all accessories, spares etc. as given in the scope of supply)							
2	Other accessories /spares etc as given in scope of supply (Individual item-wise break-up price shall be attached as an annexure to this price bid format.)							
3	Installation & Commissioning (extra, if any)							
4	Packing & Forwarding charges (extra, if any)							
5	FOR Dispatching station value in Rs.							
6	Freight & Transit insurance charges, extra, if any							
7	Total all inclusive price delivered, installed and commissioned at NITT							
8	Value of Annual Maintenance Contract							
9	Net cost to be paid by NITT							

Signature & Seal of Vendor

Note: The price bid should be submitted only as per the above format. No row shall be left blank. Please indicate NA, in case the item is "Not Applicable". If this format is not used or any column is left blank, then the bid will be rejected.