

	INDIAN INSTITUTE OF TECHNOLOGY MADRAS Chennai 600 036 Telephone: [044] 2257 9798/9723 E-mail: arpp@iitm.ac.in	
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V. Sathyanarayanan
Senior Manager (Project Purchase)

Ref: MEC/SUSH/077/2019
Date: 13.03.2019

Open Tender No: MEC/SUSH/077/2019

Due Date: 3rd April 2019, 3 PM

Pre-Bid meeting: - Not required.

Technical Bid opening meeting on 3rd April 2019, 4:00 PM at Department of Mechanical Engineering, IIT-Madras.

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of **“Image Acquisition system with digital image correlation (DIC) and High temperature test module”** conforming to the specifications given in Annexure I.

Instructions to the Bidder

- I. **Preparation of Bids:** - The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.
- II. **Delivery of the tender:** - The tender shall be sent to the addresses mentioned below, either by post or by courier so as to reach our office before the due date and time specified in our schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule.
The tender box is kept in the office of the:

**Senior Manager,
Project Purchase,
IC & SR Building 2nd floor,
I.I.T. Madras,
Chennai - 600 036.**

- III. **Opening of the tender:** - The offer/bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and will be examined by a technical committee which will decide the suitability of the bids as per our specifications and requirements. All bidders will be invited for opening of the technical bids. With respect to opening the financial bid, only technically qualified bidders will be called.

- IV. Prices:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to the **Department of Mechanical Engineering**. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. Kindly note that IIT Madras is eligible for concessional GST and relevant certificate will be issued.

In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP basis indicating the mode of shipment.

- V. Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in rupees after receipt of the equipment and its satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in the tender document even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate the percentage of payment and it should be included in the basic price quoted originally (if any)..
- VI. Terms of Delivery:** - The item should be supplied to the **Department of Mechanical Engineering, IIT Madras** as per the Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.
- VII. Technical Bid Opening:** The technical bid will be on 3rd April, 2019, 4:00 PM at the **Department of Mechanical Engineering, IIT-Madras**. The financial bids of those tenders who are technically qualified will be opened at a later date under intimation to them.
- VIII. IIT Madras** reserves the full right to accept / reject any tender at any stage without assigning any reason.

Yours sincerely,

V. Sathyanarayanan
Senior Manager (Project Purchase)
IC&SR Building, I.I.T. Madras,
Chennai - 600 036.

SCHEDULE

Important Conditions of the tender

1. The due date for the submission of the tender is **03.04.2019, 3 PM.**

The offers / bids should be submitted in two bids systems (i.e.) Technical bid and financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Open Tender for supply of **“Image Acquisition system with digital image correlation (DIC) and High temperature test module”** should be written on the left side of the Outer bigger cover and sealed.

2. **EMD: - The EMD in the form of account payee DD for 2% value of the item in favor of The Registrar - IIT Madras, payable at Chennai should be enclosed in the cover containing financial bid.** Any offer not accompanied with the EMD shall be rejected summarily as non-responsive.

The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME).

3. **Performance Security: -** The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from any nationalized bank in India. **The performance security should be furnished within 21 days from the delivery of the purchase order.**

Performance Security in the form of Bank Guarantee:- In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed through the Beneficiary Bank to the end user bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee from a Nationalized Bank of India.

The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.

4. **Indian agent:** If an Indian agent is involved, the following documents must be enclosed:
Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
 - ✓ Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
5. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.
6. Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid.

7. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
8. **Validity:** Validity of Quotation not less than 90 days from the due date of tender.
9. **Delivery Schedule:** - The tenderer should indicate clearly the time required for delivery of the item (subjected to the executive committee-IITMadras approval). In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.
If there is delay, the penalty will be @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than accepted time frame by IITM, the PO would be cancelled and liquidated damages will be enforced.
10. **Risk Purchase Clause:-** In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
11. **Payment:-**
 - (i) No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done).
 - (ii) **Advance Payment:** No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.
12. **On-site Installation:** - The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at site of IIT Madras.
13. **Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately (For more details please refer our Technical Specifications).
14. **Late offer:** - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.
15. **Acceptance and Rejection:** - I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
16. **Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**

17. Disputes and Jurisdiction:

Settlement of Disputes: Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai.

- a. **The Applicable Law:** This Purchase Order shall be construed, Interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
- b. Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.

18. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

Acknowledgement: - It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE**

TECHNICAL SPECIFICATION OF IMAGE ACQUISITION SYSTEM WITH DIGITAL IMAGE CORRELATION (DIC) AND HIGH TEMPERATURE TEST MODULE

Key Features:

- A non-contact-based technique capable of measurement of strain during static, dynamic and cyclic testing of various metals and alloys (Aluminium, Magnesium, Copper, Steel and their alloys, etc.) at various temperatures.
- The setup should have a suitable software interface which is capable of post processing of the images and giving suitable information about the strain distribution arising during various tests.
- The setup should be capable of capturing the images at high frame rates with minimum compromise on resolution of the images.
- The system should have the capability to monitor the various displacements occurring during testing such as crack opening tests, crack displacement and crack growth studies along with strain distribution at crack tip for fracture mechanics tests.

1. Primary Requirements (Mechanical Testing):

Operations	Capable of capturing the strain distribution in both 2D and 3D configuration during various static, bending related and dynamic tests. Capable of monitoring crack tip displacement and crack tip opening and assess the strain distribution around crack tip.
Materials to be experimented	Wide variety of metals and alloys (For example: aluminium, steel, copper, magnesium, titanium and their alloys and composites).
Specimen Geometry	Uniaxial Tensile and cyclic sheet type testing specimen with gauge area varying from 2 mm ² (or below) up to 3000 mm ² or more including ASTM standard and sub-standard specimen. Suitable lens system must comply. Circular specimen for uniaxial tensile tests according to ASTM standards. Standard fracture mechanics specimen.
Temperature of testing	From Room temperature to higher temperatures up to 1000 deg.C or more. Ability to capture thermomechanical events during testing.
Measurement Capabilities	Full field strain and displacement measurements in 3 dimensions. Strain range: 0.2% to 2000% for uniaxial tests. Resolution of strain: 25 micro meter or better. Displacement range: from 0.1 mm. to 30 mm.

2. Primary Requirements (Forming Tests):

Operations	Capable of capturing the strain distribution in both 2D and 3D configuration during forming tests such as Nakazima test, Ericson test and all other forming related analysis.
Materials to be experimented	Wide variety of metals and alloys (For example: aluminium, steel, copper, magnesium, titanium and their alloys and composites).
Specimen Geometry	The sample width can range between 2 mm to 80mm as per ASTM standard
Surface conditions	Speckle size range 0.05mm-1 mm.
Measurement Capabilities	Displacement or strain rate ranging from 0.001 to 20 mm/sec.
Temperature of testing	From Room temperature to higher temperatures up to 1000 deg.C or more. Ability to capture thermomechanical events during testing.
Output Requirement	Capable of providing major and minor strains for constructing the FLD.

3. Technical Specifications Required:

Camera	<p>CCD / High Resolution CMOS based camera module for Digital correlation measurement</p> <p>Resolution of 5MPx with full resolution up to 75 fps and extendable up to 250 fps.</p> <p>(Sensor resolution of 2448 * 2048px or above and pixel size of 3.4x3.4µm or better)</p> <p>Transfer rate 5000 megabits or better.</p>
Lens	<p>2 separate lens system to accommodate both high magnification and high stand-off distance.</p> <p>Suitable lens system must comply with the given specimen size</p>
Illumination System	<p>Should be capable of homogenous illumination of objects under investigation and with adjustable intensity with cold light in single colour.</p> <p>Should be optimized for A4 size specimen and when placed at a minimum distance of 30cm or more.</p> <p>One set of illumination for room temperature application with cold light in single colour.</p> <p>One set of illumination for high temperature application that must be capable to illuminate through a transparent glass.</p>
Calibration Target	3 different sets of Calibration targets and related accessories must be provided to accommodate the entire specimen size range.
Software	<p>It must be capable of computing and recording data related to strain and displacement measurements for mechanical tests and formability tests.</p> <ul style="list-style-type: none"> • Should be capable of recording and storing image series

	<p>using one or more cameras synchronise with each other using user defined camera parameters such as gain shutter speed acquisition rate and so on. Acquisition rate must be between 0.01Hz and 100 KHz depending on camera module.</p> <ul style="list-style-type: none"> • User friendly interface with minimal computation time and image storage with limited number of measurements steps using RAM. • Calibration process must be done at maximum camera resolution and its timing should be controlled by internal or external clock system. • Capable of exporting the raw data to various accessible formats: MATLAB, MATHEMATICA, Excel, CSV, ASCII, TIFF, etc. • Export image file in JPG, PNG etc. • Flexibility expandability and upgradability of software with additional software modules • 3D colour coded contour display of displacement and strains in 3 dimensions with compensation for rigid body movement and display in .stl files.
Accessories Required	<ul style="list-style-type: none"> • High temperature filters to cut out IR radiations during high temperature tests for lens system. • Laptop/ Desktop Tower PC compatible with the DIC system. • Air Brush system to generate speckle pattern on the sample with speckle size as low as 0.05 mm or better. • Mounting system and standard tripod as applicable. • Documentation/ Manual and Warranty information. • Transport cases

4. **Optional requirements:**

Strain measurement during cyclic tests	<ul style="list-style-type: none"> • Cyclic tests to be conducted at 10 Hz frequency. • Measurement capability of 0.01% to 10% during cyclic tests • A suitable trigger mechanism can be provided for cyclic tests measurement.
High Speed Requirement	<ul style="list-style-type: none"> • A high-speed camera capable of capturing images above 600 fps. • Tower PC setup compatible with high speed camera. • Software suitable for data recording at high speed.
Special lens Requirement	<ul style="list-style-type: none"> • Zoom lens with capability of focussing micro samples.

Terms and conditions (applicable for both primary and optional requirements):

Supplier capability	Supplier must provide the details of similar supplied equipment (at least 4) to the government/semi-government institutions/ reputed industries where it is being used successfully. Vendor should submit a global list of systems supplied for a minimum period of five years with complete contact details of the end users such as their phone numbers, fax numbers and email IDs, etc. Vendor should have single source Local service support facility in Chennai and provide it's contact details.
Warranty period	Entire machine inclusively all systems/ accessories should be warranted for 24 months from the date of installation/commissioning against all the design, material or manufacturing defects. Supplier should make two free visits to IIT Chennai facility as customer support program during warranty period. Free annual maintenance support and free minor software upgradation Free phone and email support for at least 10 years of the system.
Training	Supplier should provide necessary training to at least 5 persons designated by the customer and demonstrate the capability of the press at the customer site, at free of cost.
Delivery condition	Equipment to be delivered in test ready, factory calibrated condition.
Compliance statement	Compliance statement needs to be provided by vendors clearly specifying COMPLY/NON-COMPLY with remarks of all of the points mentioned above.