

 IIT PALAKKAD	भारतीय प्रौद्योगिकी संस्थान पालक्काड Indian Institute of Technology Palakkad अहलिआ एकीकृत कैम्पस, कोज़िहपारा Ahalia Integrated Campus, Kozhipara पालक्काड- 678557 Palakkad – 678 557	दूरभाषसंख्या/ Phone no: 04923 – 226300/ 590/ 586 ईमेल/ Email : purchase@iitpkd.ac.in
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Ref No: IITPKD/MECH/PSM/081/2017

Date: 08.12.2017

Due Date of the tender: 29.12.2017 @ 3 PM

TENDER FOR INVITING QUOTATIONS

Dear Sirs,

On Behalf of Indian Institute of Technology Palakkad quotations are invited for **“Combustion Measurement and Evaluation System”** confirming to the specification in the Annexure.

- Preparation of Bids:** - The tenders should be submitted **under two-bid system** (i.e.) Technical bid and Financial bid. The technical bid should consist of all technical details along with commercial terms and conditions. No prices should be included in technical bid. Financial Bid should indicate item – wise prices for the items mentioned in the technical bid. The technical and the financial bids should be put in separate cover and sealed. Both sealed covers should be put into a bigger cover.
- Compliance sheet for the specification & OEM Brochure has to be attached along with Technical bid. Vendor has to fill the compliance sheet and mention page number or reference number in OEM brochure. Unfilled / partial filled sheets lead to disqualification.**
- The Quotations duly sealed and superscribed on the envelope **with the reference No. and due date, should be addressed to the undersigned so as to reach him on or before the due date stipulated above. Fax and Email quotation are not acceptable.**
- The price should be quoted per unit and packing and delivery charges should be indicated separately. The offer/bids should be exclusive of Taxes and Duties, which will be paid by the purchaser as applicable. However the percentage and of taxes and duties as on date should be clearly indicated.
- The Quotations should be valid for **sixty days** from the due date and the period of delivery required should also be clearly indicated.
- Local Firms:** Quotations should be for free delivery to this Institute. If Quotations for Ex-Godown delivery charges should be indicated separately.
- Outside Palakkad:** Quotations should be for **F.O.R. at IIT Palakkad**. If F.O.R. consignor station, freight charges by passenger train / lorry transport must be indicated. If Ex-Godown, packing, forwarding and freight charges must be indicated.

8. Goods shall not be supplied without an official supply order.
9. **Custom Duty:** Custom Duty which will be paid at a concessional rate against duty exemption certificate.
10. **Payment:** Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later. No advance payment will be made. The Tenderer have to furnish the bank details along with tender like Account No, Account Name, IFSC Code, Bank address etc.
11. **Submission of Bids:** Quotation should be sent to the following address “**The Registrar, Indian Institute of Technology Palakkad, Ahalia Integrated Campus, Kozhipara, Palakkad -678 557, Kerala**”, Phone No: 04923 226 586/590, Email: purchase@iitpkd.ac.in.
12. **Delivery Period: Delivery Clause should be indicated clearly.**
13. **Delay in Supply or Liquidate damages:** If the supplier fails to deliver the stores within the time specified in the purchase order, the purchaser will recover from the supplier as liquidated damages a sum of one- half of one percent (0.5%) of the P.O value of the undelivered stores for each calendar week of delay. The total liquidated damages shall not exceed five percent (5%) of the P.O price of the unit or units so delayed. Stores will be deemed to have been delivered only when all their component parts are also delivered. If certain components are not delivered in time, the stores will be considered as delayed until such time as the missing parts are delivered.
14. **Late offer:** The quotation received after due date will not be considered. Please ensure that your offer is sent well in advance to reach the Institute by the due date.
15. **Loading and unloading charges will be borne by the supplier.**
16. **Acceptance and Rejection:** IIT Palakkad has the right to accept the whole or any parts of the Tender or portion of the quantity offered or reject it in full without assigning any reason.

Yours faithfully,

Encl: Specifications

Registrar, IIT Palakkad

TECHNICAL SPECIFICATION FOR COMBUSTION MEASUREMENT AND EVALUATION SYSTEM

Scope of Supply

The proposed system should consist of the following:

- i) Piezoelectric sensor suitable for cylinder pressure measurement on any modern turbocharged automotive SI and CI engine.
- ii) Charge amplifier for the piezoelectric sensor
- iii) High resolution crank angle encoder
- iv) High speed data acquisition hardware Suitable for I C engine research
- v) Software for data acquisition and IC engine combustion analysis using the cylinder pressure, manifold pressure and crank angle data
- vi) Necessary accessories for the above.

The details specifications of each of the items are:

- i) **Piezoelectric sensor for SI and CI engine in-cylinder pressure measurement:**
Un-cooled pressure sensor (0-250 bar) with a sensitivity of > 15 pC/bar with mounting thread of M5x0.5 mm capable of flush mounting on the cylinder head
- ii) **Two channel Charge Amplifiers** suitable for 0 - 14,000 pC and 0-250 bar cylinder pressure with proper drift compensation and linearity $\leq \pm 0.01$ %/FSO.
- iii) **High resolution angle encoder** for 0- 10000 rpm speed range and selectable resolution of 0.1, 0.5 and 1 deg crank angle.
- iv) **Combustion Analyser**
High speed data acquisition system with 8 channels and sampling rate not less than 2.5 MHz - configurable as per requirement, minimum 14 bit ADC resolution, 0.01deg. resolution for TDC purposes, compatible with AC power supply and working satisfactorily in operating temperature upto 50°C ambience. The analog input channels should be compatible with analog voltage input (range -10...+10 V) along with 2 additional analog inputs for current clamps for injection/ignition signals and 1 additional digital channel for crank angle encoder of optical as well as Hall or inductive VR sensor in continuous Streaming mode. Data acquisition ability during engine starts and stops.
This system should have CAN interfaces to interact with ECUs; Ethernet port for connecting combustion analyser with ECU calibration tool/software and USB port or appropriate means for storing the measured data.
- v) **Compatible software** for continuous monitoring and measurements during start, stop and transient loading of the engine for combustion study in both diesel and gasoline engines with ability to carry out combustion noise and real time knock calculation. Software should be able to display and record the signals from cylinder pressure, intake and exhaust pressure, current clamps, crank angle encoder and any universal voltage signal.

- vi) **Accessories** such as connecting cables (each 10m long) for connecting the system with piezo-electric pressure transducers, compatible power supply adapters and the ethernet cables and other necessary items like special tightening and drilling tools are to be included in the supply.

Terms and conditions

Pre-Qualification Requirements:

- The vendor should be the manufacturer of the system supplied. If the manufacturer is a company outside India then the vendor should be the sole subsidiary of the manufacturer in India and due proof of the same has to be enclosed with the quotation..
- In addition, the vendor should be a company registered under Companies Act., 1956/2013 OR a Limited Liability Partnership (LLP)/a registered partnership firm OR a sole-proprietorship entity. Appropriate registration incorporation certificate is to be submitted.
- The vendor should mention specifications, the model number and enclose original product catalogue/brochures of each equipment/item and all accessories.
- The calibration details/records where applicable are to be provided with the supply of equipment/sensor.
- The vendor has to prepare and fill the compliance sheet for the conformity of the specification giving the brochure/catalogue page numbers or reference number and attach it with the technical bid. Unfilled / partially filled sheets will lead to summary rejection/disqualification.
- Supplier of any standalone item must not only meet the required specifications but also ensure compatible with the entire analysis system (Hardware and software)
- The vendor must have supplied at least 10 units of base equipment including the sensors and all relevant electronics and indication system to reputed automotive research and development laboratories of government funded institutions or research and development divisions of leading automobile industries during the past 1 year. The details of organizations and contact persons should be furnished along with the quotation.
- The vendor should have their registered office and Service Centre in India preferably in South India (Karnataka/Andhra Pradesh/Telangana/Tamilnadu/Kerala) and trained personnel for after-sales service. Vendor has to submit the complete details of the service set up.
- The vendor must also specify clearly the scope of IIT Palakkad and the bidder with regards to the shipping, customs clearance, local transportation, site preparation and installation.
- **Warranty** for at least 12 months from the date of commissioning of the setup and training on the complete system including software by the supplier is necessary during the installation and commissioning of the equipment at site. The vendor should clearly indicate the terms of warranty along with their quote. The vendor should clearly indicate the terms of warranty along with their quote. A warranty cover of 2 years is preferred.