

# Indian Institute of Technology Delhi

Centre for Energy Studies

## NOTICE: INVITING QUOTATION (Extended)

Date: 03.12.2014

Due date: 10.12.2014

Sealed quotations are invited for the item "**Electronic Control Unit and Application Software for Internal Combustion Engines**" and technical specifications of the item are given below. The quotations should be submitted in a sealed cover (separate bids: technical and commercial) to Dr.K.A.Subramanian, Associate Professor, Room No.414, Block V, Centre for Energy Studies, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016 on or before **10.12.2014 (Wednesday)**. The late submission will not be entrained.

**Item name : Electronic Control Unit and Application Software for Internal Combustion Engines**

**Application of the item, for which brief technical specifications are given below;**

- (i) Engine Type : Spark ignition
- (ii) Rated power range : 3-7 kW
- (iii) Rated Speed range : 1000 - 5000 rpm
- (iv) Number of cylinders : 2
- (v) Engine capacity : 272 cc
- (vi) Compression ratio : 6.5:1
- (vii) Fuels used : Gasoline/Hydrogen/CNG
- (viii) Fuel supply system : Carburetion system
- (ix) Ignition system : Transistor Controlled Ignition (TCI) system

The item comprises the major components of ECU, input sensors, gas injectors, pressure reducer, application software, failure control and safe mechanism. The detailed specifications of the components are given below;

### **1. Technical specifications of electronic control unit (ECU)**

- (i) ECU type : Closed loop
- (ii) Processor : Minimum of *16 bit*
- (iii) A/D Accuracy : Minimum of *10 bit*
- (iv) Outputs : Gas Injectors ( 2-CH) and Ignition control (1-CH)

- (v) Pulse width control : One engine cycle (720° CA \_ Crank angle based pulses)
- (vi) Operating temperature range : Up to 60°C
- (vii) Voltage range : 5-16 VDC
- (viii) Current : < 10 mA

## 2. Technical specifications of input sensors

- (i) Cam/Crank sensor : Digital pulses/Hall effect
- (ii) Throttle position sensor : Minimum 10- Bit ADC, 0 – 5 V
- (iii) Manifold absolute pressure sensor : Minimum 10- Bit ADC, 0 – 5 V
- (iv) Lube oil temperature sensor : 20°C to 120°C (Minimum 10- Bit ADC, 0 – 5 V)
- (v) Air temperature sensor : 20°C to 60°C (Minimum 10- Bit ADC, 0 – 5 V)
- (vi) Gas pressure sensor : Dial gauge type high pressure sensor (10 bar - 250 bar)

## 3. Technical specifications of gas Injector

- (i) Type : Peak and hold type
- (ii) Number of injectors : 2
- (iii) Gaseous fuels : CNG, Hydrogen
- (iv) Operating temperature range : Up to 80°C

## 4. Technical specifications of pressure reducer

- (i) High pressure range : 150 bar - 250 bar (absolute)
- (ii) Low pressure range : 1 bar to 3 bar (absolute)

## 5. Technical specifications of application software

- (i) Windows based application
- (ii) Engine mapping application
- (iii) Incorporates Engine Configuration
- (iv) Mapping for Start of Injection (SOI) and Injection duration (DOI) with respect to load and engine speed on crank angle basis
- (v) Event and fault data transfer by communication at every 500ms to PC application software for ECU optimization purpose

## 6. Technical specifications of failure control and safe mechanism:

- (i) ECU : ECU Reverse Polarity protected
- (ii) Inputs & Outputs : All I/O are Short Circuit Protected

## 7. Accessories:

- Wiring harness, Communication cables, K-line Converters should be provided

## 8. Spares:

- Wiring harness : 1 Nos.
- Pressure reducer : 1 Nos.
- K-line convertor : 1 Nos.
- Communication cable : 1 Nos.

9. Warranty : 1 Year standard warranty and 2 Years extended warranty.

10. Any proof (PO/Invoice) of past selling of the similar flow meter to at least two OEMs (Original Engine Manufacturer) or R&D Organizations/Institutions should be provided.

11. Detailed technical specification including calibration chart should be provided.

### **Terms and conditions covering submission of quotations**

1. Please submit the TECHNICAL and FINANCIAL bids in two separate sealed envelopes. Mark the two envelopes clearly as “Technical Bid” and “Financial Bid”. Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as “Quotation for -----“. The quote should reach the following address on or before (date: 10.12.2014) up to 5.30 P.M.

Name:

Address:

2. Price quoted: The rates quoted must be FOB/CIF IIT Delhi, inclusive of Installation charges.

3. Quote should be in Indian Rupees as well as US Dollars and to be valid for at least three months.

4. Attach all the technical literature and a list of similar installations done in India.

5. If the quote is being submitted by the representative of the principals/manufactures themselves, a valid Agency ship/Dealership Certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.

6. Complete set of manuals for the operation and servicing of equipment should be given. All circuit diagrams, other mechanical and electrical schematics must be provided to main unit, sub systems and accessories.

7. Spare set: - A complete set of spares and consumables should be supplied for three years of trouble free operation.

8. Clearly specify the installation requirement – such as space, power, frequency, environment (Temperature and humidity) etc.

9. If the items quoted are proprietary in nature, please enclose proprietary certificate from the principals stating “certified that ----- is a proprietary item of M/s. ----- and no other manufacture make these items”.

10. If the bidder is Indian agent, the agency certificate should be enclosed.

11. Please produce compliance certificate for the specification.

12. Delivery period: 4-6 weeks on receipt of PO.
13. Authority of IIT Delhi reserves the right to reject any or all quotations without assigning any reasons.
14. Validity of quotations: Quotations will be considered valid for 3 months from the date of receipt unless otherwise stated.
15. Correspondence: No correspondence regarding acceptance or rejection of a quotation will be entertained.
16. Samples: Samples when asked for will invariably be made available and sent along with the quotations.
17. Method of submission: Quotations should be sent in a sealed cover, indicating of OUR N.I.Q. REFERENCE NUMBER AND DUE DATE FOR OPENING as otherwise these will not be considered.

The envelope must contain two SEPARATE bids:

- (i) Commercial bid
- (ii) Technical bid

18. Rejection: The quotation not conforming to the set procedures mentioned above will be rejected.
19. Discount/Rebates: Special discount/rebate wherever admissible keeping in view that the items are being supplied to an Educational Institution of National importance may be indicated.
20. Excise duty (ED) exemption certificate will be provided by IIT Delhi.

Prof. G.N.Tiwari  
Chairman

T.S.Bhatti  
Member

Dr. K.A. Subramanian  
Member

Dr. Dibhakar Rakshit  
Member