



**INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
KHARAGPUR – 721302**

SUB: PROCUREMENT FOR DEVELOPMENT OF MOTOR TEST BENCH SETUP

Tender Notice No. IIT/EE/OTG/SM/EQ/2018-19/05 Date: 10.10.2018

Indian Institute of Technology Kharagpur, an Institute of National Importance, invites sealed quotations from reputed Original Equipment Manufacturers (OEMs) or their Authorized representatives & General Suppliers for the supply of “Development of two separate motor test bench setup (30 kW and 100 kW) for the purpose of testing motors to be used in Electric Vehicle” for the Department of Electrical Engineering.

Interested vendors are requested to send their sealed bids under a **two cover system** as per requirement mentioned in tender document, along with the Technical Specifications & Compliance Certificate (as mentioned in **Annexure – I**) of the tender document.

Details are also mentioned in the Institute website www.iitkgp.ac.in [link: **Tenders**].

The proposal has to be sent in a sealed packet, containing two separate sealed envelopes (**Technical Bid** and **Price Bid**) duly superscripted with Reference Number (**Tender Notice No. IIT/EE/OTG/SM/EQ/2018-19/05**) Date: **10.10.2018**) to the office of Prof. Siddhartha Mukhopadhyay, Department of Electrical Engineering, Indian Institute of Technology, Kharagpur, P.O. Kharagpur Technology, PIN: 721 302 **on or before 09.11.2018 at 3.00 pm.**

The **technical bids will be opened on 09.11.2018 at 4.00 pm in the Office of Prof. Siddhartha Mukhopadhyay, Department of Electrical Engineering, IIT Kharagpur** in the presence of the vendors/ or their authorized representatives and price bids will be opened (to be notified separately), only of those firms, who will be found technically qualified/short listed, after evaluation of their technical bids.

**Prof. Siddhartha Mukhopadhyay
PI, CNE_OTG, IIT Kharagpur**

Encl: Annexure – I & II

Copy to:

1. Institute website
2. Jt. Registrar (Stores & Purchase)
3. CPP Portal
4. Chairman, Purchase Committee
5. Notice Board

Procurement of Development of two separate motor test bench setup (30 kW and 100 kW) for the purpose of testing motors to be used in Electric Vehicle

It will consist of following components as per the specification given in **Annexure I**.

SCOPE OF WORK

1. Delivery of all mentioned equipment at IIT Kharagpur campus.
2. The bidder must install the equipment including all hardware and software installations as per specifications given in Annexure-1. The supplied servers should be mounted on space on Rack (to be provided).
3. Bidder to ensure that the hardware and software components are compatible with each other, and provide all necessary cables, mounting rails and any other accessories, hardware or software, necessary for connecting and installing the supplied components. No additional cost will be paid for this during or after installation.

TERMS AND CONDITIONS

1. All licenses must be perpetual with free upgrades for the entire warranty period. All updates of licensed software components must be provided free of cost for the entire warranty period.
2. The bidder should preferably be ISO certified by ISO 9001 and ISO 27001.
3. The bidder should be Original Equipment Manufacturer (OEM) or authorized distributor of the systems (Attach documentary proof). The authorization letter issued by the OEM (specifically against this tender) should be enclosed. If the OEMs for some of the equipment are different, authorization letters must be enclosed for each OEM.
4. Any service request must be attended to within one week. Both the bidder and the OEM must have sales and support service centers in India. The bidder should provide the locations of sales and support service center of both the bidder and the OEM in India. If the OEM will provide first level support for some equipment, certification to this effect from the OEM must be provided.
5. Bidder should be manufacturer of Motor Test Rigs for more than 5 Years and should have supplied more than 4 Motor Test Rigs for testing "HIGH SPEED" Motors. (By High Speed we mean ≥ 10000 RPM).
6. Technical bid should contain all relevant technical details; printed technical leaflet of models quoted and other details, which may be necessary to ensure that the offer is complete in all respect e.g. technical specifications, etc.
7. Technical bid should also contain a Compliance Certificate duly signed by the bidder.
8. Price should be **quoted only in Indian Rupees** on free delivery at site **inclusive of all taxes and incidental charges**. The unit price without tax and the tax breakups should be shown separately for each item. Prices for software components, if any, must be shown as separate line items.
9. IIT Kharagpur is registered under DSIR, Govt. of India. GST rate for scientific goods is 5% as per the Notification No. 47/2017 - Integrated Tax (Rate) dated 14th November, 2017. Necessary certificate in this regard will be issued as per requirement and on request of the successful bidder.

10. IIT Kharagpur is eligible for exemption for payment of Customs Duties in terms of Government of India Notification No.51/96-Customs dated 23.07.96. Necessary certificate in this regard will be issued as per requirement and on request of the successful bidder.
11. All items should be supplied and installed as a turn-key project. L1 Bidder will be decided based on the **Grand Total** of prices of all items mentioned in the specification
12. Payment Terms: 90% Payment shall be made after successful installation of the Equipment/System duly certified by PI, CNE_OTG. Balance 10% may be released against submission of Performance Bank Guarantee to the tune of 10% of the total purchase order value. The Performance Bank Guarantee shall be issued from any Commercial Bank, validity of which shall be three years plus 60 days drawn on any commercial bank.
13. Warranty: 3 years Comprehensive onsite OEM warranty, from the date of successful installation of the equipment. The selected bidder will ensure the availability of services from professionally qualified team during implementation of the project and to provide the onsite comprehensive warranty for **THREE YEARS**.
14. Delivery Period: The equipment should be installed and commissioned within 10 weeks from the date of receipt of the Purchase Order.
15. Liquidated Damage: In the event of failure to deliver the stores beyond the specified date, liquidated damages @ 1% per month or part thereof in respect of the value of stores will be deducted, subject to a maximum of 5%; alternately the order will be cancelled and the undelivered stores purchased from elsewhere at the risk and expense of the vendor.
16. Tender Fee: An amount of Rs. 1,000.00 (Rupees One thousand only) as tender fee (nonrefundable) has to be paid. The payment shall be made by Demand Draft from any Bank in favour of "Indian Institute of Technology Kharagpur", payable at "Kharagpur". Quotation will not be accepted without the Tender Fee. Tender fee should be enclosed separately in an envelope and stapled with the Technical Bid.
17. Earnest Money Deposit (EMD): An amount of **50,000.00** (Rupees Fifty Thousand only) (Refundable) in the form of Demand Draft drawn in favour of "Indian Institute of Technology Kharagpur", payable at Kharagpur or Bank Guarantee as per format at **Annexure-II** is to be submitted. E.M.D. should be enclosed separately in an envelope and stapled with the Technical Bid document superscribed with the tender no. The validity of the EMD should be 6 (six) months from the date of issue. Any bid without EMD will summarily be rejected. No interest is payable on EMD. EMD will be refunded to the unsuccessful bidder after finalization of the tender process. No interest is payable on Security Deposit. Security Deposit shall be forfeited if the selected vendor fails to execute the contract after receiving the same.
[NOTE: IIT Kharagpur will give exemption for submission of tender fee and EMD who are registered with MSME or Central Purchase Organization or startups as recognized by DIPP as per revised rule 170 of GFR -2017 only. However proper and valid document in this regard must be submitted by the bidders in support of their claim.]
18. Bid Submission: Technical Bid and Price Bid should be submitted in two separate sealed envelopes quoting reference number on the top of the envelope. Technical bid should have a copy of the price bid with costs blanked out. Tender Fee and EMD should be enclosed with the Technical Bid documents, in separate sealed envelopes, stapled with the packet containing Technical Bid documents.
19. Acceptance of Tender: The authority of IIT, Kharagpur reserves the right to accept/reject any or the entire tender bids received without assigning any reason thereof.

20. Conditional offer will not be accepted.
21. Period of Validity: Bids shall remain valid for acceptance for a period of 120 days from the date of opening of the price bid. The benefit of downward prices (revision on account of budget/financial policy, tax revision, etc.) should be given to IIT Kharagpur by the selected OEM/vendor.
22. Past Performance of the Vendors will be judged at the time of Technical Evaluation.
23. The Institute does not bind itself to offer any explanation to those bidders whose technical bids have not been found acceptable by the Technical Evaluation Committee of the Institute.
24. Bidders should enclose the following documents:
 - a. Tender Fee.
 - b. Earnest Money Deposit (EMD).
 - c. Certificate of Registration/Trade License.
 - d. PAN number and GST registration number.
 - e. IT returns for the last three years.
 - f. Copy of product literature technical leaflet, wherever applicable for which the prices have been quoted should invariably be enclosed.
 - g. Signed copy of the tender document, with company seal, agreeing to the terms & conditions and declaration.
 - h. Copy of ISO Certification (as necessary).
25. **All tenders are to** be submitted or handed over to the office of **Prof. Siddhartha Mukhopadhyay, Department of Electrical Engineering, IIT Kharagpur**. The bids (technical and price bids) once submitted shall be the property of the Institute and shall not be returned to the vendor in future.
26. **The person/officer signing** the tender/bid documents should be delegated with an appropriate authority.
27. **Opening of Price Bids** : The Price Bid(s) of only those vendor(s) who are found technically qualified will be opened and the same will be opened before the technically qualified vendor(s). **The date for opening of price bids will be notified separately.**
28. Bidder or his/her authorized representative (with proper authorization letter for opening of technical bids and also for opening of price bids) may choose to be present at the time of opening of Technical Bids/Price Bids.
29. The addendum/corrigendum if any shall be published on Institute's Website and on CPP Portal.
30. The Institute at its discretion may change the quantity at any time before placing the order.
31. Copy of mandatory test reports, national testing/reliability and endurance test reports etc., certified or conducted at the manufacturing site, granted by the bureaus/quality control departments/national testing laboratories, as appropriate, should be enclosed.
32. **DEVIATION FROM SPECIFICATIONS**: It is in the interest of the tenderer to study the specifications in the tender schedule thoroughly before quoting so that, if the tenderer makes any deviations, the same are prominently brought out in the body of the tender. If you need to add any optional items to your system in order to meet our specifications, you are requested to quote for the total including the option required to suit our requirements. Otherwise, your tender will not be considered at all.
33. **GUARANTEE**: The tenderer has to declare that the goods sold to the buyer under this contract shall be of the best quality and workmanship and shall be strictly in accordance with

the specifications.

34. JURISDICTION: All questions, disputes, or differences arising under, out of or in connection with the contract, if concluded, shall be subject to the exclusive jurisdiction at the place from which the acceptance of Tender is issued i.e. Jurisdiction of KOLKATA HIGH COURT. Acceptance to this effect is also necessary at the time of opening of Technical Bid.

35. **IMPORTANT**

- a) A bid submitted with false information will not only be rejected but also the OEM/vendor will be debarred from participation in future tendering process.
- b) The OEMs/Vendors need to submit a certificate that they are not currently debarred or blacklisted in IIT Kharagpur for any supplies, products or services, or at present in any national organization or educational institute/university.
- c) In case of any dispute, the decision of the Director of this Institute shall be final and binding on the bidders.
- d) For any query pertaining to this bid document, correspondence be addressed to:

Prof. Dipankar Debnath,
Department of Electrical Engineering
Indian Institute of Technology, Kharagpur-721 302
Email: ddebnath@ee.iitkgp.ac.in
Phone:03222-283094

- e) In case the due date for opening tender **happens to be a holiday, the same will be accepted on the next working day**. The timings will however remain unchanged. **Please Note that the Institute remains closed during Saturdays & Sundays.**

Annexure – I

Development of two separate motor test bench setup (30 kW and 100 kW) for the purpose of testing motors to be used in Electric Vehicle

SI	Description	Specification	
1	Load Motor and controller		
Load motor specification	30 kW test bench		100 kW test bench
	Nominal power	≥30 kW	≥100 kW
	Overload power	≥50 kW (1 min)	≥200 kW (1 min)
	Nominal torque	≥120 Nm	320 Nm
	Overload torque	≥200 Nm (1min)	500 Nm (1 min)
	Max. speed (constant power)	≥7500 rpm (30kw continuous)	≥7500 rpm (100 kw continuous)
	Max. safe speed	10000 rpm	10000 rpm
Cooling	Adequate cooling should be provided for the load motor and controller		
Controller for load motor	Controller specifications	<ol style="list-style-type: none"> 1) 4-quadrant drive connected to electric grid (415 V± 20 %, 50 Hz, 3-phase) 2) The speed-torque profile must be user controllable. (To emulate various loading condition including inertia). Adequate GUI must be provided for setting the load motor characteristics. 3) The control algorithm and switching strategy must be user controllable. 4) On-board Real Time Ethernet (IEEE 1588 V2) 5) Dual on-Board Ethernet Switch (one port should be available for interfacing the 4-Q controller with software like Matlab/Cruise) 6) Essential drive related safety interlocks should be provided which will bypass all controls and enforce shutdown in case of emergency. 7) At least one Universal Encoder (≥5000 ppr) from which the user will get rotor position information 8) Drive should be compatible to operate Asynchronous / Synchronous /Low Inertia Motor / Permanent Magnet Motors / Servo Motors / Linear Motors / Traction Motors 	
2	Torque flange (factory calibrated)		
Torque flange (factory calibrated)	30 kW test bench		100 kW test bench
	Nominal torque	200 Nm	500 Nm
	Accuracy	0.05% f.s.d or better	
	Speed range	Up-to 10000 rpm	
3	Coupling	Suitable flexible coupling for the rated torque and maximum speed range	

4	Burst protection	To be provided with electronic interlock	Steel sheet with minimum 5mm thickness
5	Operation control panel with PC, data acquisition and report generation		
		Computer and UPS	1) Mouse, keyboard, 4 GB RAM, intel i5 processor or better, DVD/cd drive, 500 GB HD, network interface 2) Uninterruptible power supply for PC: ≥ 1000 VA 3) must be loaded with necessary software and hardware tools to run the test bench and monitor its functioning
		Data acquisition and report generation	To monitor and logging of various test parameters viz. output power, Torque, speed, power factor, reactive power, harmonic analysis, etc. A standard data processing tool must be provided to generate test report.
		Operation panel	Proper sequence to start, run, and stop the test system
6	Test bench parameters	Measured values	1. Torque 2. Speed 3. Position of rotor 4. Motor current (3 Ph) 5. Motor voltage (3 Ph) 6. Motor and converter Temperature
		Operands	1. Mechanical power 2. Electrical power 3. Efficiency factor
		Control	1. Speed control 2. Current control (torque limited) 3. Torque control
7	Safety features	1. Emergency off button 2. Safety relays 3. EMC filtering for power electronics and EMI filtering for power analyzer Protection from rotating parts	
8	Mechanical construction	MS fabricated stool, with suitable height and stress relieved, and designed to withstand the dynamic shocks	

9	Mounting facility for test/drive motor	The mounting system must be capable to accommodate wide range of EV drive motors	The mounting base for the test motor must have adjustable height and length with proper coupling arrangement for connection with load motor.	
10	Test motor and its controller (to be quoted as optional)			
	Test motor specification		30 kW test bench	100 kW test bench
		Nominal power	≥ 30 kW	≥ 100 kW
		Overload power	≥ 45 kW (for 30 sec)	≥ 150 kW (for 30 sec)
		Nominal torque	≥90 Nm	≥320 Nm
		Overload torque	≥125 Nm (30 sec)	≥500 Nm (30 sec)
		Max. safe speed	10000 rpm	10000 rpm
		Cooling	Adequate cooling should be provided for the load motor and controller	
	Controller for test motor	Specification for controller	<ol style="list-style-type: none"> 1) 4-quadrant drive connected to electric grid (415 V ± 20 %, 50 Hz, 3-phase) 2) The controller should come with a pre-loaded test-library which is user selectable. Moreover, users should be able to bypass all pre-loaded test library and load their own algorithm to run the test motor. 3) The interfacing details of current sensors (grid current, motor currents), voltage sensors (grid voltage, dc link voltage), and encoders should be clearly mentioned so that the user can write their own drive control algorithm. These measurement signals should also be made available through one suitable port so that the users can interface their own control card and generate the gate pulses for the converter switches while bypassing the gate signals generated by the internal controller. 4) Essential drive related safety interlocks should be provided which will bypass all controls and enforce shutdown in case of emergency. 	
11	Rugged laptop (quantity: two, one for each test bench) (To be quoted as optional)	Processor Brand	Intel	
		Processor Type	Core i5	
		Processor Speed	≥ 2.30 GHz	
		Processor Count	≥ 2	
		RAM Size	≥ 8 GB	
		Computer Memory Type	DDR3 or DDR4 SDRAM	
		Hard Drive Size	≥ 500 GB	

		Hard Disk Technology	Shock-protected removable HDD
		Wi-Fi and Bluetooth	802.11ac Wi-Fi Bluetooth 4.0 and above
		Connections	USB 3.0 / HDMI / Docking Connector/ LAN connector
		Operating System	Windows 10 pro
		Graphics	Integrated Intel HD Graphics 520
		Screen size	≥ 14 inch
		Average Battery Life (in hours)	≥ 10 hours
12	Current probe (quantity: two, one for each test bench) (To be quoted as optional)	Bandwidth	DC to ≥ 1 MHz
		Max. current	≥500 A (RMS)
		Accuracy of measurement	≤5% of reading
		Lowest measureable current	≤1 A
13	Digital storage oscilloscope (quantity: two, one for each test bench) (To be quoted as optional)	Analog Bandwidth	≥ 200MHz
		Operating Voltage Range	100V-240Vac ±10% at 45-60 Hz
		Sample Rate	≥ 1GS/sec (per channel)
		No. of Channels	4 fully isolated and floating channels
		Record Length	≥ 2500 Points
		Time base range	≤ 5 ns/div to >=50s/div
		Input Coupling	AC, DC, GND
		Input/vertical sensitivity	≤ 2 mV to >=5V/div
		Trigger Mode	Auto, Normal, Single Shot, Edge, Pulse, Video
		FFT analysis	inbuilt
		Insulation Category	≥ 600V RMS CAT II
		Interface Connectivity	RS232/ USB/Ethernet
		Probes (4 Nos.) 10:1	Compatible Bandwidth Probes. They should support the specified insulation category
		Other included accessories	(i) Battery Charger/mains Adapter, (ii) Li-ion Battery for 6hours of operation or more, (iii) Manuals on CD-Rom

Note:

- 1) Quotation for 30 kW test bench and 100 kW test bench should be submitted separately. They will be treated as two independent items.
- 2) Item/specification mentioned under Serial No 3-9 are applicable to both the test benches.
- 3) Quote Price for the following items as optional: (a) test motor and its controller, (b) current probe, (c) digital storage oscilloscope, (d) rugged laptop.
- 4) Dynamometer/load motor must be part load tested and should be Speed tested to 10000 RPM during Pre-dispatch inspection at Supplier facility.
- 5) Spare parts and optional accessories may be quoted separately.

ANNEXURE – II

MODEL BANK GUARANTEE FORMAT FOR FURNISHING EMD

Whereas(hereinafter called the "tenderer") has submitted their offer dated for the supply of (hereinafter called the "tender") against the purchaser's tender Notice No.

KNOW ALL MEN by these presents that WE of having our registered office at are bound unto (hereinafter called the "Purchaser") in the sum of for which payment will and truly to be made to the said Purchaser, the Bank binds itself, its successors and assigns by these presents. Sealed with the Common Seal of the said Bank this Day of 20

THE CONDITIONS OF THIS OBLIGATION ARE

- (1) If the tenderer withdraws or amends, impairs or derogates from the tender in any respect within the period of validity of this tender.
- (2) If the tenderer having been notified of the acceptance of his tender by the Purchaser during the period of its validity:
 - (a) If the tenderer fails to furnish the Performance Security for the due performance of the contract.
 - (b) Fails or refuses to accept/execute the contract.

WE undertake to pay the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it owing to the occurrence of one or both the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including 45 days after the period of tender validity and any demand in respect thereof should reach the Bank not later than the above date.

(Signature of the authorized officer of the Bank)

Name and designation of the officer

Seal, name & address of the Bank and address of the Branch