



Indian Institute of Technology Jodhpur

N.H. 62, Nagaur Road, Karwar, Jodhpur - 342030, Rajasthan (India)

☎ 0291-2801352 | ✉ office_ee@iitj.ac.in

Website: Department: <https://www.iitj.ac.in/electrical-engineering/> | IITJ: www.iitj.ac.in

INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

Request For Technical Information and Pro Forma Quotations

For Procurement of Digital Motor Control and Motor Test-Bench Setups

1. Permanent Magnet Synchronous Motor (PMSM) control setup.
2. Switched Reluctance Motor (SRM) control setup

1. Introduction

The Indian Institute of Technology Jodhpur (IIT Jodhpur) intends to procure **Digital Motor Control and Motor Test-Bench Setups** (1. Permanent Magnet Synchronous Motor (PMSM) control setup, 2. Switched Reluctance Motor (SRM) control setup.

for academic instruction, laboratory courses, student projects, doctoral research, sponsored research, industrial consultancy, and advanced research in electric drives, power electronics, embedded systems, and digital motor control.

Before initiating the formal procurement process, the Institute invites **Technical Information** and **Indicative Pro Forma Quotations** from eligible Original Equipment Manufacturers (OEMs) or their authorized representatives.

2. Purpose

The objectives are to:

- Obtain technical information from prospective OEMs/authorized representatives.
- Obtain indicative Pro forma quotations for estimating the procurement cost.

3. Disclaimer

This document is issued **only for obtaining technical information and indicative Pro Forma quotations**.

Submission of information under this proposal:

- shall **not** be treated as a financial bid;
- shall **not** constitute any commitment on the part of IIT Jodhpur to procure the equipment;
- shall **not** confer any right upon the participating firm for award of any future contract;
- Shall **not** automatically qualify the responding firm for participation in any future tender.

The Institute reserves the right to modify the technical specifications, estimated cost, procurement methodology, or procurement timeline based on its requirements.

4. Equipment Details

- Name of Equipment: **Digital Motor Control and Motor Test-Bench Setups**
 1. Permanent Magnet Synchronous Motor (PMSM) control setup Qty: 01 No's
 2. Switched Reluctance Motor (SRM) control setup Qty: 01 No's



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- **Broad Functional Requirements (The essential functions or capabilities that the equipment should have, without mentioning a specific make, model, or brand):**

The Indian Institute of Technology Jodhpur intends to procure **two independent Digital Motor Control and Motor Test-Bench Setups** comprising:

1. Permanent Magnet Synchronous Motor (PMSM) Digital Motor-Control Setup
2. Switched Reluctance Motor (SRM) Digital Motor-Control Setup

These experimental platforms shall be designed for undergraduate and postgraduate laboratory courses, student projects, doctoral research, sponsored research, industrial consultancy, and advanced research in electric drives, power electronics, digital motor control, embedded control systems, industrial automation, transportation electrification, renewable energy applications, and intelligent drive systems.

Each experimental set-up shall consist of a laboratory-scale electric machine, programmable power electronic converter, digital motor controller, controllable load machine or dynamometer, electrical and mechanical sensors, signal-conditioning interface, real-time controller, integrated data acquisition (DAQ) system, engineering workstation, control software platform, and all accessories required for the implementation, testing, validation, and performance evaluation of conventional and advanced motor-control algorithms.

The laboratory platforms shall enable users to study electrical machine modelling, parameter identification, power converter operation, PWM techniques, current regulation, torque and speed control, Field-Oriented Control (FOC), Direct Torque Control (DTC), sensor-based and sensor less control, regenerative braking, field weakening, maximum torque-per-ampere (MTPA) operation, efficiency mapping, torque-ripple minimization, power quality analysis, thermal behaviour, stability analysis, disturbance rejection, observer design, state estimation, embedded controller implementation, real-time digital control, hardware-software integration, and advanced intelligent control strategies for electric drive systems.

The PMSM Digital Motor-Control Setup shall support studies on vector control, Clarke and Park transformations, current-loop and speed-loop tuning, torque control, field weakening, MTPA operation, regenerative braking, efficiency evaluation, parameter estimation, and high-performance servo-drive applications.

The SRM Digital Motor-Control Setup shall support studies on phase-current control, commutation-angle optimization, torque-speed characteristics, inductance and flux-linkage modelling, torque-ripple analysis and reduction, current profiling, sensor less operation, regenerative operation, vibration and acoustic-noise analysis, and advanced control techniques for switched reluctance drives.

The broad functional requirements are indicative and may be modified by the Institute after evaluation of the technical information received from prospective suppliers.



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Common Requirements for both setups

Sl. No.	Requirement	specifications
1	Complete physical setup	Complete ready-to-operate bench with motor, power converter, digital controller, controllable load machine or dynamometer, sensors, coupling, guards, power supplies, cables and accessories. Simulation-only or HIL-only offers are not acceptable.
2	Power level	Suitable laboratory-scale rating for teaching and research. A range around 1 kW to 3 kW is preferred; another rating may be proposed with justification.
3	Loading system	Programmable load machine or dynamometer for controlled speed and torque. Motoring, braking and bidirectional operation are preferred. The vendor shall describe energy dissipation or regeneration.
4	MATLAB/Simulink compatibility	Users shall be able to edit controllers in MATLAB/Simulink, generate or compile code, deploy it to the supplied controller, tune parameters online, observe signals and log data. Simple data transfer to MATLAB is not sufficient.
5	Open controller development	Control models, algorithms and experiment files shall be editable and shall not be restricted to fixed or precompiled vendor experiments.
6	Measurements	Measurement of motor phase currents, relevant voltages, DC-link quantities, rotor position or speed, shaft torque and mechanical power. Temperature measurement may also be offered.
7	Power and efficiency analysis	Suitable power analyzer or integrated system for electrical input/output power, power factor, frequency, efficiency and relevant drive quantities. The vendor shall state channels, bandwidth, accuracy and export capability.
8	Data acquisition	Real-time display, recording and export of electrical and mechanical variables, including speed, torque, current, power and efficiency characteristics.
9	Mechanical construction	Rigid modular frame with alignment facility, suitable shaft coupling and transparent guards over rotating components.
10	Safety and protection	Emergency stop, isolation, over-current, over-voltage, under-voltage, overload, over-speed and temperature protection as applicable, with hardware and software interlocks.
11	Software and licences	All essential drivers, target-support packages, runtime software and licences shall be included or clearly identified. Perpetual academic licences are preferred.
12	Documentation	System architecture, circuit diagrams, motor and converter data, sensor calibration, controller examples, user manual, experiment manual and maintenance instructions.
13	Installation and training	Installation, commissioning, acceptance demonstration and hands-on training for faculty, staff and students.



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1. Technical specifications for PMSM Digital Motor-Control Setup:

Sl. No.	Functional area	requirements
1	Motor	Three-phase PMSM suitable for variable-speed operation. The bidder shall state whether it is surface-mounted or interior permanent-magnet type and provide rated parameters.
2	Power converter	Three-phase voltage-source inverter with DC-link supply, isolated gate drive, current sensing and suitable protection.
3	Position and speed feedback	Encoder, resolver or equivalent rotor-position sensor for closed-loop control. Sensor less control may be offered additionally.
4	Minimum control capability	Editable current control, field-oriented control, speed control and torque control implemented through MATLAB/Simulink.
5	Additional desirable capability	Parameter identification, maximum-torque-per-ampere control, field weakening, regenerative braking, sensor less control and efficiency-map generation.
6	Indicative experiments	Clarke and Park transformations, current- and speed-loop tuning, torque response, load disturbance response, torque-speed characteristics, efficiency evaluation and braking.

2. Technical specifications for SRM Digital Motor-Control Setup:

Sl. No.	Functional area	requirements
1	Motor	Multi-phase switched reluctance motor for teaching and research. The bidder shall state phase number, stator/rotor pole configuration, rating and operating-speed range.
2	Power converter	Independent phase converter, such as asymmetric half-bridge or equivalent, enabling controlled excitation and de-excitation of individual phases.
3	Feedback and sensing	Rotor-position or commutation feedback, phase-current measurement, DC-link measurement, shaft speed and torque measurement.
4	Minimum control capability	Editable MATLAB/Simulink implementation of phase commutation, current regulation, speed control and torque-producing operation.
5	Adjustable control parameters	User-adjustable turn-on and turn-off angles, current reference, current-control method, switching frequency and speed-controller gains.
6	Motor model and characteristics	Provision of, or experimental means to obtain, phase inductance or flux-linkage variation with rotor position and current, and torque characteristics for modelling and control.
7	Additional desirable capability	Torque-ripple reduction, direct torque control, advanced current profiling, sensor less control, regenerative operation and acoustic-noise or vibration studies.
8	Indicative experiments	Phase-current control, commutation-angle study, speed response, torque-speed characteristics, load disturbance rejection, efficiency assessment and torque-ripple analysis.



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5. Eligibility Criteria

Interested firms should:

- Be an Original Equipment Manufacturer (OEM) or an authorized distributor/dealer.
- Have experience in supplying similar equipment.
- Have adequate installation and after-sales service support in India.

6. Information/Documents to be Submitted

The interested firms shall submit the following (*Annexure-I*):

1. Company Profile.
2. Details of the OEM.
3. Product Brochure/Catalogue.
4. Detailed Technical Specifications.
5. Compliance with the Broad Functional Requirements.
6. List of previous users/clients with installation reports
7. Details of Warranty.
8. Details of After-Sales Service Support.
9. Authorization Letter from OEM (where applicable).
10. Any additional technical information relevant to the offered equipment.

7. Pro forma Quotation

- Interested firms are requested to submit a Pro forma Quotation (*Annexure-II*) along with their Request for Technical Information and Pro Forma Quotations response. Indicative **Pro Forma** quotation in Indian Rupees (INR), including the cost of the equipment, essential accessories, taxes, duties, freight, insurance, Installation, commissioning, training, and any other associated charges. Wherever applicable, the Annual Maintenance Contract (AMC) and/or Comprehensive Maintenance Contract (CMC) charges and spare parts shall be quoted separately as additional charges.
- Expected delivery schedule and other relevant technical and commercial information.

Important Note:

- The **Pro Forma** quotation is required only for cost estimation and budget planning purposes.
- The prices quoted shall be indicative/non-binding.
- The Pro Forma quotation shall not be treated as a financial bid.
- Submission of a **Pro Forma** quotation shall not confer any right or preference in the subsequent procurement process.

8. Presentation/Demonstration

The Institute may invite for a technical presentation or product demonstration. The date and venue shall be communicated separately.



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9. Submission:

Interested firms may submit their Proforma Quotations on or before the due date in sealed cover or through email (as applicable).

The envelope/email should be superscribed as:

"Request for Technical Information and Pro forma Quotations for Procurement of Digital Motor Control and Motor Test-Bench Setups"

8. Important Dates

Activity	Date
Publication	3 rd August 2026
Last Date for Submission	25 th August 2026
Technical Presentation (if required)	To be informed
Clarification Meeting (if required)	To be informed

10. General Terms & Conditions

1. This **Request for Technical Information and Pro forma Quotations** is issued only for obtaining technical information and **Pro Forma** estimates.
2. The Institute reserves the right to accept or reject any or all responses without assigning any reason.
3. Submission of a **Request for Technical Information and Pro forma Quotations** does not create any contractual obligation.
4. The Institute may seek additional information, technical clarifications, demonstrations, or presentations from any participant.
5. The Institute may modify the technical requirements based on the responses received.
6. The final technical specifications may be prepared by the User Committee after evaluating all **Request for Technical Information and Pro forma Quotations** responses.
7. The subsequent procurement, if any, shall be carried out through an appropriate procurement method in accordance with the GFR 2017 and applicable procurement rules.
8. Participation in this **Request for Technical Information and Pro forma Quotations** does not automatically entitle any firm to participate in or receive any preference during the subsequent tender process.

11. Contact Details

Name: Dr. Deepak Kumar Fulwani

Designation: Professor

Department: Electrical Engineering

Email: df@iitj.ac.in



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Annexure-I

Request For Technical Information and Pro forma Quotations Response Format

1. Name of the Firm:
2. Registered Address:
3. Name of OEM (if applicable):
4. Contact Person:
5. Email:
6. Phone:
7. Product Name and Model:
8. Brief Technical Description:
9. Compliance with Broad Functional Requirements:
10. List of previous users/clients with installation reports:
11. After-Sales Service Details:
12. Any Additional Features:
13. Remarks (if any).

Note: In *Brief Technical Description*, It should contain five separate subsections:

1. **Permanent Magnet Synchronous Motor (PMSM) Digital Motor-Control Setup**
2. **Switched Reluctance Motor (SRM) Digital Motor-Control Setup**

Each subsection can include:

Power electronic converters, real-time digital controllers, programmable loading systems, sensors, and DAQ hardware. The systems shall support MATLAB/Simulink-based controller development, real-time experimentation, performance evaluation, efficiency analysis, and advanced electric drive research.



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Annexure-II

Format for Pro forma Quotation

Sl. No.	Description	Amount (INR)
1	Indicative Pro forma quotation in Indian Rupees (INR), including the cost of the equipment, essential accessories, taxes, duties, freight, insurance, installation, commissioning, training, and any other associated charges.	

Warranty Period: _____

AMC/CMC Charges (after warranty): _____

Delivery Period: _____

Authorized Signatory

Name: _____

Designation: _____

Company Seal & Signature