

Department of Mechanical Engineering

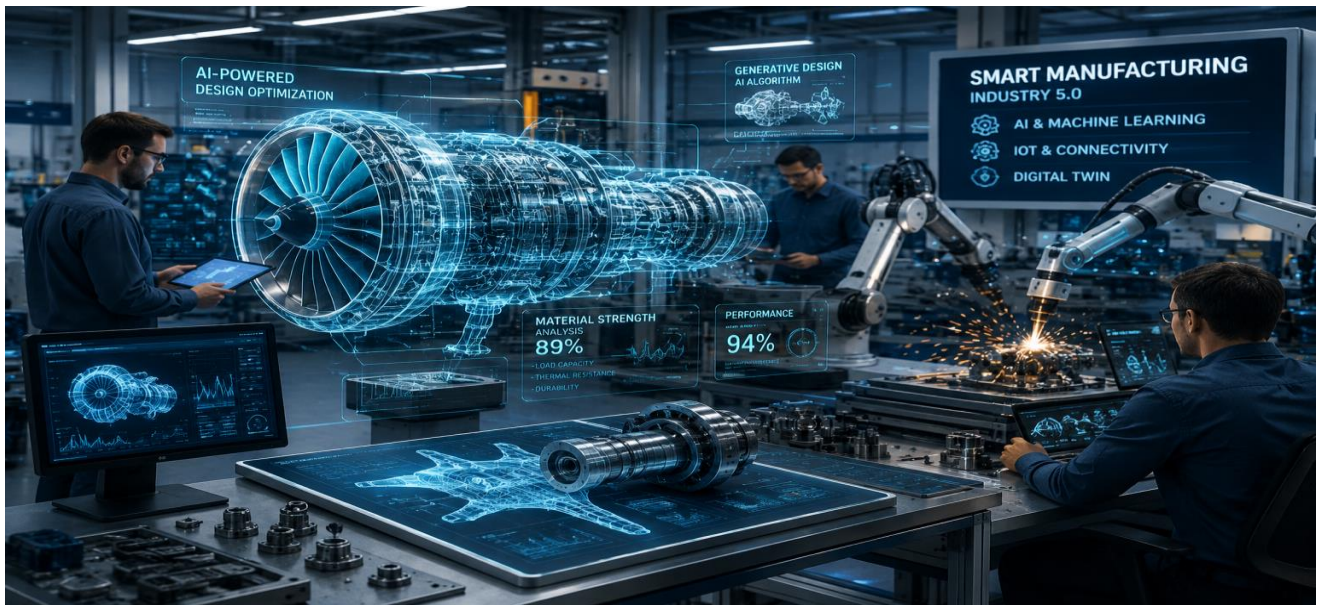
July-Sep-2025

ECHELON INSTITUTE OF TECHNOLOGY



NEWS LETTER July-Sep 2025

DEPARTMENT OF MECHANICAL ENGINEERING



ECHELON INSTITUTE OF TECHNOLOGY, FARIDABAD

INSTITUTE VISION AND MISSION

Vision

Technical and Management leaders engaged in the evolution of life, being at the frontiers of the continuous technological and administrative breakthroughs, inspired by ongoing exploration of self, society, and nature through self-reflective consciousness by building a culture of inspiration, exploration and growth.

Mission

M-1: Having a culture of inspiration, exploration and invention through effective, experiential teaching-learning giving rise to ever evolving knowledge and wisdom.

M-2: To have self-inspired students ever engaged in continually working upon and sharpening and deepening computational, creative, innovative and leadership consciousness.

M-3: Having students established in self-reflective consciousness, committed to personal, social & human integrity and engaged in deep inquiry and conversation, giving rise to shared, inter-subjective human values and consciousness.

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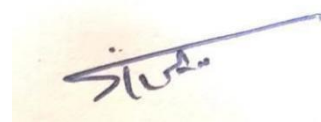
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Assistant Professor
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Innovation and Start-up Ecosystem Enablers: **Empowering Future Entrepreneurs**

The Department of Mechanical Engineering, Echelon Institute of Technology, Faridabad, successfully organized an insightful Panel Discussion on "Innovation and Start-up Ecosystem Enablers", bringing together eminent experts from academia, industry, and the entrepreneurial ecosystem. The event aimed to inspire students to embrace innovation, entrepreneurship, and technology-driven problem-solving while understanding the rapidly evolving start-up landscape in India.

The panel discussion focused on the importance of transforming innovative ideas into successful ventures through structured incubation support, research, intellectual property rights, government initiatives, industry collaboration, and funding opportunities. The experts shared their experiences on building sustainable start-ups, overcoming entrepreneurial challenges, and leveraging emerging technologies such as Artificial Intelligence (AI), Industry 5.0, Internet of Things (IoT), Robotics, Additive Manufacturing, Electric Vehicles, Digital Twins, and Smart Manufacturing.



Government Project

Government Projects on Renewable Energy and Green Hydrogen (2025)

Prepared for Newsletter / Departmental Publication

Introduction

The Government of India has launched several flagship projects and initiatives to accelerate renewable energy deployment, green hydrogen production, sustainable manufacturing, and energy security. These initiatives support the national vision of achieving 500 GW of non-fossil fuel-based energy capacity by 2030.

PM Surya Ghar: Muft Bijli Yojana

Promotes rooftop solar systems for one crore households. During 2025, over 14.43 lakh rooftop solar systems were installed, benefiting more than 18.14 lakh households.

PM-KUSUM Scheme

Supports solar-powered irrigation and decentralized renewable energy for farmers through solar pumps and solar power plants.

National Green Hydrogen Mission

Promotes green hydrogen production, hydrogen mobility, industrial applications, R&D, Hydrogen Valley projects, and startup innovation.

Solar Energy Expansion

India achieved record solar capacity growth with large-scale solar parks, rooftop solar, and domestic manufacturing.

Wind Energy Development

Expansion of wind power capacity supported by new manufacturing guidelines and prototype turbine policies.

National Policy on Geothermal Energy

Encourages geothermal exploration, research, innovation, and technology development for clean energy.

Research & Innovation

Supports advanced solar cells, bioenergy, green hydrogen technologies, and renewable energy research facilities.

Capacity Building

National workshops, stakeholder consultations, and awareness programmes to strengthen renewable energy adoption.

Key Highlights (2025)

Parameter	Achievement
Renewable Energy Added	44.51 GW
Total Renewable Energy Capacity	253.96 GW
Total Non-Fossil Capacity	262.74 GW
Solar Capacity	132.85 GW
Wind Capacity	53.99 GW
Non-Fossil Share	51.55% of installed electricity capacity

Conclusion

These flagship programmes demonstrate India's commitment to sustainable development, clean energy, energy independence, and technological innovation while creating opportunities for research, industry, and employment.

Source: Government of India, Ministry of New and Renewable Energy (MNRE), 2025 Progress Report.

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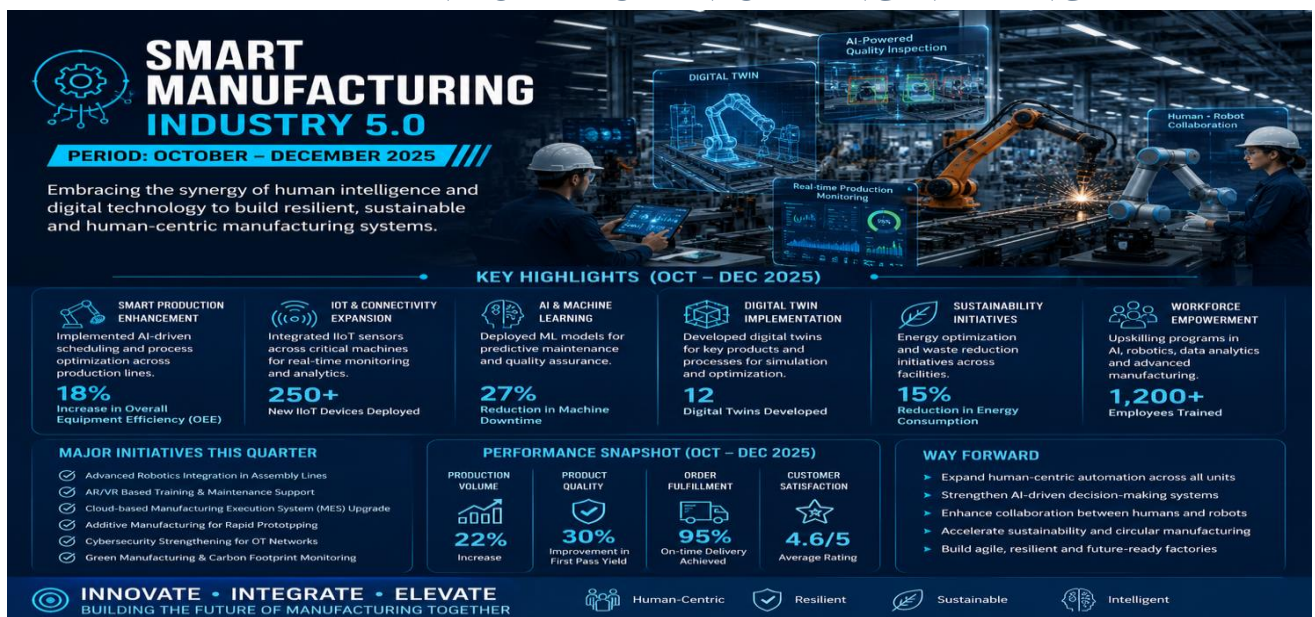
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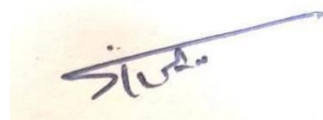
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"Innovation begins where curiosity meets engineering."

Every remarkable invention begins with a simple question: "What if?" Curiosity is the driving force behind discovery, while engineering provides the knowledge and tools to transform ideas into reality. Together, they fuel innovation that improves lives, strengthens industries, and shapes a sustainable future.

In today's rapidly evolving technological landscape, engineers are not merely problem-solvers—they are innovators, creators, and visionaries. By embracing emerging technologies such as Artificial Intelligence, Industry 5.0, Robotics, Digital Twins, Additive Manufacturing, and Smart Manufacturing, engineers are developing intelligent solutions to address complex global challenges.

At the Department of Mechanical Engineering, we believe that innovation flourishes in an environment that encourages curiosity, creativity, and continuous learning. Through project-based learning, research, industrial collaborations, technical workshops, and hands-on laboratory experiences, our students are inspired to question conventional approaches, explore new possibilities, and develop solutions that have a meaningful impact on society.

As we continue our journey toward engineering excellence, let us remain curious, think creatively, and innovate fearlessly. Every question asked, every experiment conducted, and every challenge accepted brings us one step closer to building a smarter, greener, and more sustainable world.



Department of Mechanical Engineering

Oct-Dec-2025



Government Project

Hydro Engineering & Technology Development & Renovation & Modernization (R&M) Division

Driving Innovation and Sustainability in India's Hydropower Sector

Hydropower remains one of India's most dependable renewable energy sources. The Hydro Engineering & Technology Development and Renovation & Modernization (R&M) Division of the Central Electricity Authority (CEA) plays a key role in promoting technological advancement, modernization, safety, and sustainable development of the country's hydro power sector.

Strengthening India's Hydropower Infrastructure

The division undertakes technical activities related to planning, design, engineering, operation, maintenance, and modernization of hydroelectric projects. It provides consultancy for electrical and mechanical systems of hydroelectric power plants and Pumped Storage Projects (PSPs), while evaluating Detailed Project Reports (DPRs), engineering layouts, equipment specifications, and revised cost estimates to ensure compliance with national standards.

Renovation & Modernization (R&M)

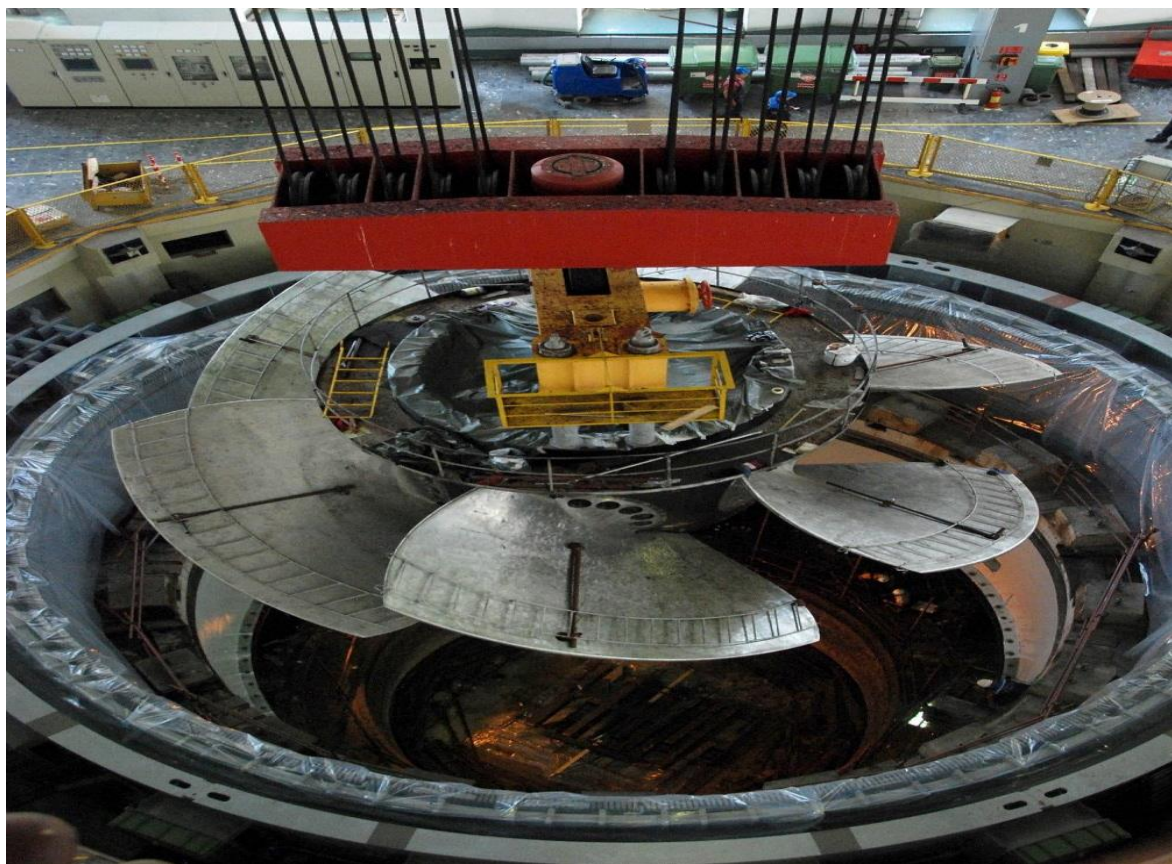
The division prepares technical guidelines, identifies projects requiring modernization, reviews DPRs, and monitors implementation through quarterly progress reports. These initiatives improve plant efficiency, reliability, and operational life.

Research, Innovation & Technology Development

The division promotes advanced engineering practices, evaluates innovative technologies, facilitates research projects, and collaborates with research organizations, government agencies, power utilities, and academic institutions to strengthen India's hydro power infrastructure.

Safety & Regulatory Support

Safety audits of hydro generating stations and substations are conducted in accordance with the Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electric Plants and Electric Lines) (Amendment) Regulations, 2022. The division also supports national policies, Make in India initiatives, parliamentary matters, and international cooperation.





Major Activities

- Development of technical standards and regulations for hydro power projects.
- Design and engineering consultancy for hydroelectric plants and pumped storage projects.
- Evaluation of DPRs, revised cost estimates, and project layouts.
- Preparation of Renovation & Modernization (R&M) guidelines.
- Monitoring modernization works through quarterly progress reports.
- Safety audits of hydroelectric generating stations and substations.
- Promotion of research, innovation, and technology transfer.
- Support for the Make in India initiative through local manufacturing guidelines.
- Technical assistance to State Governments, power utilities, and international cooperation projects.

Recent Technical Reports (2025–2026)

- Quarterly Progress Report of R&M Works (October–December 2025)
- Quarterly Progress Report of R&M Works (January–March 2026)
- Guidelines for Renovation & Modernisation of Hydro Power Stations
- Guidelines for Field Efficiency Test in Hydropower Plants
- Revised SOP for Early Warning Systems in Hydro Electric Projects
- CEA Committee Report on Variable Speed vs Fixed Speed Machines in Pumped Storage Plants
- Report on Hydro Kinetic Turbine Technology
- Technical Standards for Construction of Hydro Electric Generating Stations

Conclusion

The Hydro Engineering & Technology Development and R&M Division plays a crucial role in strengthening India's renewable energy infrastructure through modernization, technological innovation, engineering excellence, and safety. Its continuous efforts improve the efficiency, reliability, and sustainability of hydroelectric power generation, supporting India's long-term clean energy and energy security goals.

Department of Mechanical Engineering

Jan-Mar-2026

ECHELON INSTITUTE OF TECHNOLOGY



NEWS LETTER Jan-Mar 2026

DEPARTMENT OF MECHANICAL ENGINEERING

2026
JAN - MAR

EMERGING TECHNOLOGIES

JAN - MAR | 2026

Innovate | Automate | Transform

Shaping a
Smarter & Sustainable
Future

01 AI AGENTS & AUTONOMOUS SYSTEMS - AI agents becoming more autonomous and task-oriented - Applied across business operations, healthcare, finance & more - Human-AI collaboration becomes mainstream	02 QUANTUM COMPUTING PROGRESS - More stable qubits and error correction breakthroughs - Early industrial applications in optimization, cryptography & drug discovery	03 ADVANCED ROBOTICS & COBOTS - Smarter, safer, and more adaptable robots - Widely adopted in manufacturing, logistics, healthcare & agriculture - Human-robot teamwork reaches new levels
04 6G CONNECTIVITY RESEARCH - Research & trials for 6G networks accelerate - Ultra-low latency, terabit speed & massive connectivity - Enabling next-gen XR, holographic communication & IoT	05 SUSTAINABLE ENERGY INNOVATIONS - Solid-state batteries move closer to commercialization - Green hydrogen & energy storage solutions scale up - Clean energy adoption accelerates globally	06 DIGITAL TWIN EVOLUTION - Real-time digital replicas become more accurate and AI-driven - Used for predictive maintenance, smart cities, and system optimization
07 BIOTECH & GENETIC ENGINEERING - CRISPR & gene editing technologies advance - Personalized medicine and treatments expand - Synthetic biology opens new possibilities	08 SPATIAL COMPUTING & XR - XR devices become lighter, smarter & more affordable - Immersive learning, training, gaming & remote collaboration grow - Spatial computing integrates with AI	09 CYBERSECURITY NEXT-GEN - AI-powered threat detection & response - Zero-trust architecture becomes standard - Focus on data privacy and cyber resilience

KEY TAKEAWAY

The first quarter of 2026 will be pivotal in accelerating intelligent automation, sustainable solutions, and human-centric innovations.

IMPACT AREAS

HealthcareManufacturingEducationMobilityEnvironmentBusiness

THE FUTURE IS NOW

Embrace change, adapt fast and innovate continuously to stay ahead in 2026.

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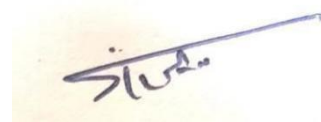
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“Departmental Achievements: January–March 2025”

During January–March 2025, the Department of Mechanical Engineering at Echelon Institute of Technology continued its efforts toward academic excellence, practical learning, innovation, and industry readiness. The department encouraged students to strengthen their engineering fundamentals through classroom teaching, laboratory practice, continuous assessment, and faculty mentoring. Practical and project-based learning provided students with opportunities to apply theoretical concepts to real engineering problems. The department also promoted industrial exposure and professional interaction, helping students understand manufacturing processes, modern machinery, quality practices, and workplace requirements. Student projects encouraged creativity and problem-solving in areas such as electric mobility, renewable energy, automation, CAD modelling, and sustainable engineering. Expert lectures and knowledge-sharing activities supported awareness of emerging technologies and career opportunities. In addition, CAD and digital-design learning strengthened students' technical capabilities and familiarity with modern engineering tools. Overall, the quarter reflected the department's commitment to developing competent, innovative, industry-ready, and socially responsible mechanical engineers.

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KEY ACHIEVEMENTS (JANUARY–MARCH 2025)

ACADEMIC EXCELLENCE



Strengthened fundamentals through effective teaching, assessments and faculty mentoring.

LABORATORY PRACTICE



Hands-on experiments and practice sessions to enhance technical skills and understanding.

PRACTICAL & PROJECT LEARNING



Students applied theoretical concepts to real-world engineering problems through projects.

INDUSTRIAL EXPOSURE



Industrial visits and professional interactions to understand modern manufacturing and quality practices.

STUDENT PROJECTS



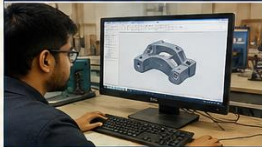
Innovative projects in electric mobility, renewable energy, automation, CAD modelling and sustainable engineering.

EXPERT LECTURES



Expert talks and knowledge-sharing sessions on emerging technologies and career opportunities.

CAD & DIGITAL DESIGN



Enhanced learning through CAD tools, 3D modelling and digital design for modern engineering applications.

FACULTY ACHIEVEMENTS



Faculty members contributed to academic growth through research, publications and professional development.

STUDENT PARTICIPATION



Active participation in technical events, competitions and quizzes; bringing laurels to the department.

COMMITMENT TO EXCELLENCE



Continuous efforts to build competent, innovative, industry-ready and socially responsible mechanical engineers.



Strong Fundamentals



Practical Learning



Industry Readiness



Innovation & Creativity



Sustainable Engineering

Government Project

Government of India Initiatives in Advanced Mechanical Manufacturing During January–March 2026: A Review of Rare-Earth Permanent Magnets and Capital-Goods Technology Development

Abstract

The Government of India has increasingly focused on strengthening domestic manufacturing capabilities in advanced engineering sectors through technology development, indigenous manufacturing, research infrastructure and industry-oriented government programmes. During January–March 2026, several important developments were reported in the areas of advanced manufacturing, capital goods, electric mobility, robotics, materials engineering and critical-material supply chains. This paper reviews selected Government of India initiatives during this period with particular emphasis on the Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets (REPM) and the Scheme for Enhancement of Competitiveness in the Indian Capital Goods Sector.

A major development during the study period was the release of a global Request for Proposal on 20 March 2026 by the Ministry of Heavy Industries for establishing integrated sintered NdFeB rare-earth permanent magnet manufacturing facilities with an aggregate capacity of 6,000 metric tonnes per annum. The scheme has a financial outlay of ₹7,280 crore and is intended to strengthen domestic manufacturing and reduce import dependence in critical sectors. Rare-earth permanent magnets have direct applications in electric vehicle motors, wind turbines, industrial motors, aerospace and defence systems. During the same period, the Government also reported progress under the Capital Goods Sector Scheme, including advanced Centres of Excellence, Common Engineering Facility Centres, testing facilities, technology-development projects and advanced skill-development initiatives. The study demonstrates the strong relevance of these initiatives to Mechanical Engineering through applications in materials processing, manufacturing technology, robotics, machine design, electric mobility, energy systems and Industry 4.0. Keywords: Mechanical Engineering, Government Projects, Advanced Manufacturing, Rare Earth Permanent Magnets, NdFeB, Capital Goods, Electric Vehicles, Robotics, Industry 4.0, India

1. Introduction

Mechanical Engineering is undergoing a major transformation because of developments in advanced manufacturing, electric mobility, robotics, renewable-energy systems, smart machines and new engineering materials. The Government of India has introduced and strengthened several programmes to increase indigenous manufacturing capability and reduce dependence on imported technologies and critical components.

2026, significant government-level developments were reported in advanced manufacturing and engineering. Among these, the development of a domestic rare-earth permanent-magnet manufacturing ecosystem is particularly relevant to Mechanical Engineering because permanent magnets are essential components in electric motors, wind turbines and several high-performance engineering systems.

To examine the technical significance of advanced manufacturing and critical-material projects.

To study the relevance of rare-earth permanent magnets to electric mobility and renewable-energy systems.

To review government-supported capital-goods projects involving robotics, manufacturing, testing and engineering research.

To identify opportunities for Mechanical Engineering students and institutions to engage with these emerging technologies.

3. Research Methodology

The study follows a documentary review and secondary-data research methodology.

Information was collected from official Government of India sources, particularly:

- Press Information Bureau (PIB)
- Ministry of Heavy Industries
- Government notifications and official project information
- Government statements relating to capital goods and electric mobility

The study period was restricted to January 2026–March 2026 for identifying developments and announcements relevant to the Mechanical Engineering field.

The analysis focuses on:

- Government project/initiative
- Date of major development
- Technical area
- Financial/project scale
- Mechanical Engineering relevance
- Industrial application
- Educational and research relevance

4. Major Government Initiative: Rare Earth Permanent Magnet Manufacturing

4.1 Background

Rare-earth permanent magnets, particularly sintered NdFeB magnets, are important advanced engineering materials. They provide high magnetic performance while enabling compact and efficient electric motors and generators.

- Electronics and other advanced engineering applications

The Government of India approved the Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets with a financial outlay of ₹7,280 crore. The scheme aims to establish integrated manufacturing capacity of 6,000 MTPA in India.

5. Major Development During March 2026

A significant development occurred on 20 March 2026, when the Ministry of Heavy Industries released the Request for Proposal for selection of beneficiaries to establish integrated sintered NdFeB rare-earth permanent-magnet manufacturing facilities.

The proposed aggregate manufacturing capacity is 6,000 metric tonnes per annum.

The government specified a two-stage bidding mechanism involving:

1. Technical bid
2. Financial bid

The bidding process was to be conducted through the Central Public Procurement Portal using a Least Cost System mechanism. The bid submission deadline was specified as 28 May 2026, while technical bids were scheduled to be opened on 29 May 2026.

This March 2026 development is particularly significant because it represents a transition from a policy/scheme stage toward the selection and establishment of actual manufacturing facilities.

6. Technical Significance for Mechanical Engineering

The proposed REPM manufacturing ecosystem has strong multidisciplinary relevance.

6.1 Materials Engineering

Mechanical engineers are involved in:

- Material selection
- Powder processing
- Alloy development
- Heat treatment
- Sintering
- Mechanical characterization
- Surface treatment
- Failure analysis

6.2 Manufacturing Engineering

The production of permanent magnets requires several manufacturing stages, including material processing, forming, sintering, machining and finishing.

These activities require:

- Production planning
- Process optimisation
- CNC machining
- Quality control
- Automation
- Dimensional inspection
- Process monitoring

6.3 Machine Design

Permanent magnets are key components in electric motors and generators. Mechanical engineers contribute to:

- Rotor design
- Shaft design
- Housing design
- Thermal management
- Structural analysis
- Vibration analysis
- Mechanical integration

6.4 Electric Vehicle Technology

High-performance permanent magnets are widely used in traction motors. Consequently, domestic magnet manufacturing can support India's electric-mobility manufacturing ecosystem.

6.5 Renewable Energy

Permanent magnets are also used in several wind-turbine generator configurations. Therefore, domestic manufacturing can support renewable-energy equipment manufacturing.

7. Capital Goods Sector Projects During January–March 2026

Another important government programme relevant to Mechanical Engineering is the Scheme for Enhancement of Competitiveness in the Indian Capital Goods Sector – Phase II.

The Ministry of Heavy Industries reported that 29 projects had been sanctioned under Phase II. These included:

- 7 Centres of Excellence
- 4 Common Engineering Facility Centres
- 6 Testing and Certification Centres
- 9 Industry Accelerators for Technology Development
- 3 projects for development of qualification packs for higher skill levels.

These projects demonstrate the Government's emphasis on combining research institutions, industry, advanced manufacturing facilities and skill development.

8. Robotic Laser Cladding Project for Hydro Turbines

One particularly relevant project reported by the Government in February 2026 was the project on:

“Robotic Laser Cladding Technology for Hydro Turbines using Tungsten Carbide Powder.”

The project in Ghaziabad was reported with a total project cost of approximately ₹4.97 crore.

This project is highly relevant to Mechanical Engineering because it combines:

- Robotics
- Laser processing
- Surface engineering
- Advanced materials
- Wear resistance
- Turbine technology
- Additive/manufacturing processes
- Industrial automation

Laser cladding can be used to deposit a wear-resistant material onto an engineering surface, potentially improving component life and reducing the need for complete replacement of expensive components.

For Mechanical Engineering students, this project provides a practical example of how modern manufacturing technologies are being applied to heavy engineering equipment.

9. Common Engineering Facility Centres

The Government has also supported Common Engineering Facility Centres under the capital-goods scheme.

Examples reported by the Ministry include:

- CEFC at ARAI, Pune
- CEFC by BHEL for advanced welding technologies
- Augmentation of CEFC at C4i4, Pune
- Augmentation of the Smart Factory facility at IISc Bengaluru
- CEFC at the Welding Research Institute, BHEL, Trichy.

These facilities are important because they provide infrastructure for:

- Testing
- Training
- Technology demonstration

Such facilities create opportunities for collaboration between engineering institutions and industry.

10. Relationship with Electric Mobility

Electric mobility represents one of the most important emerging application areas for Mechanical Engineering.

The Government's March 2026 activities concerning electric vehicles included discussions and parliamentary information relating to:

- Promotion of electric vehicles
- Domestic EV manufacturing
- EV component indigenization
- Development of India as an EV manufacturing hub
- PM E-DRIVE-related activities
- Automotive and auto-component manufacturing.

The development of domestic rare-earth permanent magnets is directly connected with this ecosystem because permanent magnets are important components in several high-efficiency electric-motor technologies.

Thus, the government initiatives create a technological chain:

Critical minerals → Materials processing → Permanent magnets → Electric motors → Electric vehicles → Advanced manufacturing.

11. Relevance to Renewable Energy

The proposed domestic permanent-magnet manufacturing ecosystem is also relevant to renewable-energy technologies.

Permanent magnets are used in selected wind-turbine generator technologies because they can enable high power density and efficient generator designs.

Therefore, development of domestic REPM manufacturing may contribute to:

- Wind-energy equipment
- Generator manufacturing
- Electric machines
- Energy conversion systems
- Renewable-energy supply chains

This creates an important research opportunity for Mechanical Engineering in areas such as thermal management, structural design, vibration, manufacturing and reliability.

12. Industry 4.0 and Smart Manufacturing

Government-supported capital-goods initiatives also emphasize modern manufacturing technologies.

Previous government information on the Capital Goods Scheme identifies Industry 4.0 centres and technology platforms supporting smart manufacturing, automation, manufacturing technology development and technology adoption.

The relevance to Mechanical Engineering includes:

- CNC machining
- Robotics
- CAD/CAM
- Digital manufacturing
- Sensors
- Industrial automation

These technologies are increasingly becoming essential skills for modern mechanical engineers.

13. Research Opportunities for Mechanical Engineering

The government initiatives identified during the January–March 2026 period provide several research opportunities.

13.1 Advanced Materials

Potential research areas include:

- NdFeB magnet materials
- Sintering processes
- Material characterization

13.2 Electric Machines

Potential topics include:

- Permanent-magnet motors
- EV traction motors
- Motor thermal management

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Department of Mechanical Engineering

April-Jun-2026

ECHELON INSTITUTE OF TECHNOLOGY



NEWS LETTER APRIL-JUN 2026

DEPARTMENT OF MECHANICAL ENGINEERING

Departmental Achievements: April–June 2026

Department of Mechanical Engineering, Echelon Institute of Technology

During April–June 2026, the Department of Mechanical Engineering continued its commitment to academic excellence, practical learning, innovation, and industry readiness. The department strengthened theoretical foundations and encouraged hands-on laboratory practice, project-based learning, and continuous assessment. Students actively participated in industrial visits, expert interactions, workshops, and technical events that enhanced their exposure to modern manufacturing, automation, electric mobility, and sustainable technologies. Innovation-driven projects focused on EV systems, renewable energy, robotics, CAD/CAE, smart manufacturing, and advanced materials. Faculty members contributed to research, publications, certifications, and curriculum enrichment initiatives. Digital design and simulation activities improved students' engineering capabilities and industry preparedness. Overall, the department remains dedicated to developing competent, innovative, industry-ready, and socially responsible mechanical engineers.



KEY ACHIEVEMENTS (APRIL–JUNE 2026)

ACADEMIC EXCELLENCE  Strengthened fundamentals through effective teaching, assessments and faculty mentoring.	LABORATORY PRACTICE  Hands-on experiments and practice sessions to enhance technical skills and understanding.	PRACTICAL & PROJECT LEARNING  Students applied theoretical concepts to real-world engineering problems through projects.	INDUSTRIAL EXPOSURE  Industrial visits and professional interactions to understand modern manufacturing and quality practices.	STUDENT PROJECTS  Innovative projects in electric mobility, renewable energy, automation, CAD modelling and sustainable engineering.
EXPERT LECTURES & WORKSHOPS  Expert talks and workshops on emerging technologies and industry trends for career growth.	CAD & DIGITAL DESIGN  Enhanced learning through CAD/CAE tools, 3D modelling and simulation for modern engineering applications.	FACULTY ACHIEVEMENTS  Faculty members contributed to research, publications, certifications and curriculum enrichment.	STUDENT PARTICIPATION  Active participation in technical events, competitions and quizzes; bringing laurels to the department.	COMMITMENT TO EXCELLENCE  Continuous efforts to build competent, innovative, industry-ready and socially responsible mechanical engineers.



Strong Fundamentals



Practical Learning



Industry Readiness



Innovation & Creativity



Sustainable Engineering

ECHELON INSTITUTE OF TECHNOLOGY, FARIDABAD

INSTITUTE VISION AND MISSION

Vision

Technical and Management leaders engaged in the evolution of life, being at the frontiers of the continuous technological and administrative breakthroughs, inspired by ongoing exploration of self, society, and nature through self-reflective consciousness by building a culture of inspiration, exploration and growth.

Mission

M-1: Having a culture of inspiration, exploration and invention through effective, experiential teaching-learning giving rise to ever evolving knowledge and wisdom.

M-2: To have self-inspired students ever engaged in continually working upon and sharpening and deepening computational, creative, innovative and leadership consciousness.

M-3: Having students established in self-reflective consciousness, committed to personal, social & human integrity and engaged in deep inquiry and conversation, giving rise to shared, inter-subjective human values and consciousness.

ECHELON INSTITUTE OF TECHNOLOGY, FARIDABAD

DEPARTMENT OF MECHANICAL ENGINEERING VISION AND MISSION

Vision

To cultivate mechanical engineers who embody technical excellence, innovative leadership, and ethical consciousness, contributing to sustainable technological advancements while being inspired by self-reflection, societal needs, and environmental harmony.

Mission

M1: To foster a culture of experiential and applied learning, enabling students to develop advanced technical skills, creativity, and problem-solving abilities in mechanical engineering.

M2: To inspire students to pursue innovative research and sustainable engineering solutions while nurturing leadership and entrepreneurial potential.

M3: To instill ethical values and a sense of responsibility, encouraging students to engage in self-reflective practices, contribute to societal well-being, and uphold the principles of environmental stewardship.

ECHELON INSTITUTE OF TECHNOLOGY, FARIDABAD

FROM THE DESK OF THE EDITOR-IN-CHIEF

It gives me immense pleasure to present this edition of the **Mechanical Engineering Department Newsletter**, showcasing the latest achievements, innovations, and activities of our department. The semester has been marked by a vibrant blend of academic excellence, technical engagement, and co-curricular accomplishments, reflecting the dedication and enthusiasm of our students and faculty.

This newsletter highlights the significant events, achievements, industrial interactions, workshops, expert lectures, competitions, and other noteworthy activities that have enriched the academic environment during the semester. It offers readers a comprehensive glimpse into the dynamic journey of the department and its continuous pursuit of excellence.

At the Department of Mechanical Engineering, we firmly believe that education extends beyond the classroom. Alongside a rigorous academic curriculum, we strive to create an engaging and stimulating learning environment by encouraging participation in industrial visits, technical clubs, skill development programs, innovation activities, and personality development initiatives. These experiences enable our students to enhance their technical competence, leadership qualities, creativity, and professional skills.

I sincerely appreciate the dedicated efforts of our faculty members, staff, students, and all stakeholders whose commitment and enthusiasm have contributed to the department's continued growth and success. Their collective efforts have fostered a culture of innovation, collaboration, and lifelong learning.

I hope this newsletter provides an insightful overview of our department's accomplishments and inspires our readers to remain connected with our ongoing journey of academic and professional excellence. We welcome your valuable suggestions and feedback as we continue to strive for greater heights.



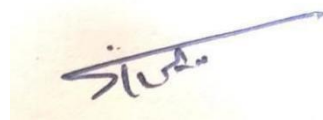
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ECHELON INSTITUTE OF TECHNOLOGY, FARIDABAD

ENDEAVOUR BY HOD

The Aim of our department is to provide quality education. The process of learning is extremely important in life. What you learn, how you learn and where you learn play a crucial role in developing one's intellectual capability, besides career. I am proud to see that the students and faculty of our department have put in appreciable effort into creating this newsletter. This newsletter highlights the academic and non-academic activities of both faculty and students of the Department of Mechanical Engineering.

I congratulate the editorial team for their brilliant and original efforts. I wish all the students and faculty a great academic career



Dr. Sindhu Kumar
HOD Mechanical Engineering
EIT, Faridabad

ABOUT THE DEPARTMENT

The Department of Mechanical Engineering is committed to developing competent engineers with strong technical knowledge, practical skills, and professional ethics to meet the ever-evolving demands of industry and society. Mechanical Engineering is one of the oldest and broadest branches of engineering, encompassing the principles of mechanics, materials, manufacturing, thermal sciences, design, automation, and emerging technologies. It plays a vital role in the development of industries such as automotive, aerospace, energy, robotics, manufacturing, and smart infrastructure.

The department offers a comprehensive curriculum that blends fundamental sciences, mathematics, engineering principles, and advanced mechanical engineering concepts. Students gain in-depth knowledge in areas such as Engineering Mechanics, Strength of Materials, Theory of Machines, Machine Design, Manufacturing Processes, Welding Technology, Fluid Mechanics, Thermal Engineering, Heat Transfer, CAD/CAM, CNC Machining, Robotics, Mechatronics, Industrial Automation, and Additive Manufacturing. The curriculum is carefully designed to bridge the gap between theoretical understanding and industrial practice.

To enhance practical learning, the department is equipped with well-established laboratories and modern software tools including AutoCAD, CATIA, SolidWorks, ANSYS, MasterCAM, CNC Programming, CAD/CAM, and simulation packages that enable students to design, analyze, and optimize engineering components and systems. Students are encouraged to undertake innovative projects, participate in technical competitions, and engage in interdisciplinary research to strengthen their problem-solving and analytical abilities.

The department places strong emphasis on experiential learning through industrial visits, internships, workshops, expert lectures, value-added courses, and skill development programs. Every semester, students are exposed to real-world industrial environments by visiting leading manufacturing industries, automobile companies, thermal and power plants, research organizations, and production facilities. Mandatory industrial training and internships provide hands-on experience, enabling students to understand modern manufacturing practices, quality systems, and industrial operations.

Beyond academics, the department actively promotes innovation, entrepreneurship, research, and professional development through technical seminars, conferences, industrial collaborations, and student clubs. Faculty members continuously mentor students to develop leadership qualities, teamwork, communication skills, and lifelong learning attitudes.

With a focus on academic excellence, industry readiness, and technological innovation, the Department of Mechanical Engineering strives to produce highly skilled, socially responsible, and globally competent mechanical engineers capable of addressing contemporary engineering challenges and contributing to sustainable technological advancement.

“Departmental Achievements: April–June 2025”

During April–June 2026, the Department of Mechanical Engineering continued its focus on academic excellence, practical learning, innovation, research, and industry readiness. The department strengthened students’ engineering fundamentals through classroom teaching, laboratory practice, continuous assessment, and faculty mentoring. Practical and project-based learning encouraged students to apply mechanical engineering concepts to real-world problems.

During the quarter, emphasis was placed on advanced manufacturing, electric mobility, automation, CAD/CAE, renewable energy, smart manufacturing, materials engineering, and sustainable engineering. Students were encouraged to develop technical skills through laboratory activities, design exercises, project work, workshops, expert interactions, and technical events. Faculty members supported research-oriented learning and encouraged students to explore emerging technologies and government-supported industrial initiatives.

The department also promoted awareness of contemporary developments in Indian manufacturing, including advanced materials, rare-earth permanent magnets, electric vehicles, capital goods, robotics, and Industry 4.0. CAD modelling, simulation, digital design, and hands-on experimentation strengthened students’ engineering capabilities and industry preparedness. Overall, the quarter reflected the department’s commitment to developing competent, innovative, industry-ready, and socially responsible mechanical engineers.

Departmental Achievements: April–June 2026

Department of Mechanical Engineering, Echelon Institute of Technology

During April–June 2026, the Department of Mechanical Engineering continued its commitment to academic excellence, practical learning, innovation, and industry readiness. The department strengthened theoretical foundations and encouraged hands-on laboratory practice, project-based learning, and continuous assessment. Students actively participated in industrial visits, expert interactions, workshops, and technical events that enhanced their exposure to modern manufacturing, automation, electric mobility, and sustainable technologies. Innovation-driven projects focused on EV systems, renewable energy, robotics, CAD/CAE, smart manufacturing, and advanced materials. Faculty members contributed to research, publications, certifications, and curriculum enrichment initiatives. Digital design and simulation activities improved students’ engineering capabilities and industry preparedness. Overall, the department remains dedicated to developing competent, innovative, industry-ready, and socially responsible mechanical engineers.



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Strong Fundamentals

Practical Learning

Industry Readiness

Innovation & Creativity

Sustainable Engineering

GOVERNMENT PROJECT REPORT

Development of Integrated Rare Earth Permanent Magnet Manufacturing Facilities in India

Project Monitoring and Technical Review

Period: April–June 2026

Field: Mechanical Engineering / Advanced Manufacturing / Materials Engineering / Electric Mobility

Implementing Ministry: Ministry of Heavy Industries, Government of India

Project: Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets

Technology: Sintered NdFeB Rare Earth Permanent Magnets

Proposed National Capacity: 6,000 Metric Tonnes Per Annum (MTPA)

Scheme Financial Outlay: ₹7,280 Crore

1. Executive Summary

The Government of India has initiated a major programme to establish an indigenous manufacturing ecosystem for **sintered Rare Earth Permanent Magnets (REPMs)**. The initiative is being implemented by the Ministry of Heavy Industries with the objective of developing domestic manufacturing capability for high-performance permanent magnets used in electric vehicles, wind turbines, advanced motors, aerospace, defence and other high-technology applications.

The scheme has a financial outlay of **₹7,280 crore** and aims to establish an aggregate integrated manufacturing capacity of **6,000 MTPA** for sintered NdFeB rare-earth permanent magnets in India. The proposed manufacturing chain is intended to extend from NdPr oxide to finished magnets, thereby strengthening domestic supply chains and reducing dependence on imported permanent magnets.

The period from **April to June 2026** was particularly important for project implementation. On **7 April 2026**, the Ministry of Heavy Industries conducted a pre-bid conference for prospective bidders, with participation from at least 25 companies. The conference provided an opportunity for industry stakeholders to seek clarification regarding the tender and proposed manufacturing facilities.

On **15 May 2026**, the Government extended the bid submission deadline from 28 May to 29 June 2026 and rescheduled the opening of technical bids from 29 May to 30 June 2026. The extension was provided to facilitate wider participation and allow stakeholders additional time to prepare their bids.

Subsequently, on **25 June 2026**, the Ministry again extended the bid submission deadline from 29 June to **29 July 2026**, while technical bids were rescheduled for opening on **30 July 2026**.

Thus, April–June 2026 represents an important project-development and procurement phase for establishing India's domestic rare-earth permanent-magnet manufacturing capability.

2. Introduction

Permanent magnets are critical components in many modern engineering systems. Among them, sintered NdFeB magnets offer high magnetic energy density and are widely used where compact, high-performance electric motors and generators are required.

Their applications include:

- Electric vehicles
- Wind turbines
- Industrial motors
- Generators
- Aerospace systems
- Defence equipment
- High-end electronics
- Advanced automation systems

The increasing adoption of electric mobility and renewable-energy technologies has increased the strategic importance of rare-earth permanent magnets.

Recognising the importance of these materials, the Government of India approved the Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets with a financial outlay of ₹7,280 crore and a targeted integrated manufacturing capacity of 6,000 MTPA.

The project is particularly relevant to Mechanical Engineering because its successful implementation requires expertise in materials processing, manufacturing, heat treatment, machining, quality control, automation, machine design, thermal management and production engineering.

3. Project Objectives

The major objectives of the Government project are:

1. To establish domestic manufacturing capacity for sintered NdFeB permanent magnets.
2. To develop an integrated manufacturing ecosystem for rare-earth permanent magnets.
3. To reduce India's dependence on imported permanent magnets.
4. To strengthen domestic supply chains for electric vehicles.
5. To support wind-energy and generator manufacturing.
6. To promote indigenous advanced-material manufacturing.
7. To strengthen India's capital-goods and engineering ecosystem.
8. To promote technology development and manufacturing capabilities.
9. To create opportunities for research and development in advanced materials.
10. To support India's long-term strategic manufacturing capabilities.

4. Project Scale

The major project parameters are summarised below.

Parameter	Details
Government Ministry	Ministry of Heavy Industries
Project/Scheme	Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets
Technology	Sintered NdFeB REPM
Proposed Capacity	6,000 MTPA
Financial Outlay	₹7,280 crore
Procurement Method	Global tender
Tender Platform	Central Public Procurement Portal
Bid Evaluation	Least Cost System
Manufacturing Chain	NdPr oxide to finished magnets
Major Applications	EVs, wind turbines, motors, aerospace, defence
Study Period	April–June 2026

The Government's March 2026 tender invited manufacturers to establish integrated facilities with a combined capacity of 6,000 MTPA.

5. Project Activities During April–June 2026

5.1 April 2026 – Pre-Bid Conference

A major project activity took place on **7 April 2026**, when the Ministry of Heavy Industries organised a pre-bid conference for prospective bidders.

The conference received significant industry participation, with **at least 25 companies** attending.

The purpose of the conference was to:

- Explain tender requirements
- Clarify technical requirements
- Address questions from prospective bidders
- Improve industry participation
- Facilitate competitive bidding
- Support transparent procurement

The event represented an important transition from project announcement and tender publication toward industry participation and implementation.

Mechanical Engineering significance

The pre-bid stage is important from an engineering-project-management perspective because manufacturers need to assess:

- Plant capacity
- Manufacturing technology
- Production equipment
- Material-processing requirements
- Quality-control systems
- Automation requirements
- Testing facilities
- Investment requirements
- Technology partnerships

6. May 2026 – Extension of Tender Timeline

On **15 May 2026**, the Ministry of Heavy Industries announced an extension of the tender timeline.

The original:

- Bid due date: **28 May 2026**
- Technical-bid opening: **29 May 2026**

were revised to:

- Bid due date: **29 June 2026**
- Technical-bid opening: **30 June 2026**

The Government stated that the extension was intended to facilitate wider participation and provide additional time for stakeholders involved in the bidding process.

This development demonstrates the complexity of establishing an advanced manufacturing facility requiring significant technical, financial and industrial planning.

7. June 2026 – Further Extension

On **25 June 2026**, the Ministry announced another extension of the tender timeline.

The revised schedule became:

Activity	Revised Date
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Bid submission deadline	29 July 2026
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Opening of technical bids	30 July 2026
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The Government explained that the extension was made in response to requests from multiple stakeholders and was intended to facilitate wider participation.

Therefore, June 2026 represented an important procurement and stakeholder-engagement stage rather than the physical commissioning of manufacturing plants.

8. Project Timeline: April–June 2026

Month	Government Activity	Project Significance
April 2026	Pre-bid conference	Industry engagement and clarification
May 2026	First tender extension	Additional preparation time for bidders
June 2026	Second tender extension	Wider stakeholder participation
End of June 2026 Technical bids scheduled for July Procurement process continued		

This timeline provides clear documentary evidence that the project remained under active government implementation during the April–June 2026 period.

9. Technical Background of NdFeB Permanent Magnets

NdFeB magnets are based primarily on the neodymium-iron-boron material system.

A simplified representation of the principal magnetic phase is:

$\text{Nd}_2\text{Fe}_{14}\text{B}$

The material provides high magnetic performance and is therefore suitable for compact high-performance motors and generators.

The production of sintered NdFeB magnets involves several important manufacturing stages.

General Manufacturing Sequence

Rare-earth material preparation

↓

Alloy preparation

↓

Hydrogen processing / powder preparation

↓

Fine powder production

↓

Magnetic-field alignment

↓

Compaction

↓

Sintering

↓

Heat treatment

↓

Machining

↓

Surface coating

↓

Magnetic and mechanical testing

↓

Finished NdFeB magnet

Each stage involves significant mechanical and manufacturing-engineering considerations.

10. Mechanical Engineering Role in the Project

The project has direct relevance to several areas of Mechanical Engineering.

10.1 Manufacturing Engineering

Mechanical engineers can contribute to:

- Production-system design
- Process planning
- Machine selection
- Automation
- Production-line optimisation
- Process control
- Quality assurance

10.2 Materials Engineering

Important areas include:

- Material composition
- Powder metallurgy
- Sintering
- Heat treatment
- Grain structure
- Mechanical properties
- Corrosion resistance

10.3 Machine Design

The magnets manufactured under the programme can subsequently be integrated into:

- Electric motors
- Generators
- Wind turbines
- Industrial machines
- Robotic systems

Mechanical engineers are responsible for mechanical integration and structural design.

10.4 Thermal Engineering

Permanent magnets operate within temperature-sensitive engineering systems.

Therefore, research can involve:

- Magnet temperature
- Heat generation
- Cooling systems
- Thermal degradation
- Motor thermal management

10.5 Quality Engineering

Quality-control requirements include:

- Dimensional accuracy
- Magnetic properties
- Density
- Surface quality
- Mechanical integrity
- Temperature resistance
- Corrosion resistance

11. Application in Electric Vehicles

One of the most important applications of NdFeB permanent magnets is electric-vehicle traction motors. A simplified EV system can be represented as:

Battery → Inverter → Electric Motor → Transmission → Wheels

Permanent magnets are integrated into the motor's rotor in several permanent-magnet motor configurations.

Advantages can include:

- High power density
- Compact motor size
- High efficiency
- Reduced rotor excitation losses
- Suitable performance for traction applications

Therefore, domestic permanent-magnet manufacturing can support the broader electric-mobility manufacturing ecosystem.

12. Application in Wind Energy

Permanent magnets can also be used in permanent-magnet generators for wind turbines.

The general energy-conversion chain is:

Wind Energy → Rotor → Generator → Power Electronics → Electrical Grid

The development of domestic REPM manufacturing can therefore support manufacturing of advanced electrical machines used in renewable-energy systems.

This creates research opportunities in:

- Generator design
- Thermal management
- Structural analysis

21. Limitations

This report reviews an authentic Government of India project and its documented developments during April–June 2026.

However, it should **not** be stated that Echelon Institute of Technology or its Mechanical Engineering Department executed this Government project unless there is official documentary evidence of participation, collaboration, funding or project implementation.

22. Conclusion

The **Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets** represents one of the most significant Government of India advanced-manufacturing initiatives relevant to Mechanical Engineering during the April–June 2026 period.

The project proposes an integrated domestic manufacturing capacity of **6,000 MTPA**, supported by a financial outlay of **₹7,280 crore**.

During April 2026, the Ministry conducted a pre-bid conference with participation from at least 25 companies. In May, the tender deadline was extended to 29 June, and in June it was further extended to 29 July, with technical bids rescheduled for 30 July 2026.

The project is highly relevant to Mechanical Engineering because it connects **advanced materials, powder processing, manufacturing technology, machine design, thermal engineering, quality control, electric vehicles, renewable energy and Industry 4.0**.

The initiative therefore provides a strong example of how Government of India projects are creating new opportunities for mechanical engineers in advanced manufacturing and emerging technology sectors.