VOL:8

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Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
DEEMED TO BE UNIVERSITY

University with Graded Autonomy Status

(An ISO 21001 : 2018 Certified Institution)
Periyar E.V.R. High Road, Maduravoyal, Chennai-95. Tamilnadu, India.

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

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FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT O FMECHANICALENGINEERING

UNIVERSITY VISION & MISSION

VISION

To provide for contemporary knowledge delivery of global standards, excellence in knowledge creation in emerging areas and mutually rewarding university–societal interactions.

MISSION

To make the Institution a Resource Centre for Higher Level Teaching–Learning in Engineering, Medicine, Allied Health Sciences, Architecture, Management & Education — imparting technically qualified, practically competent human resources with entrepreneurial skills and ethical values for the benefit of Society and Nation.

DEPARTMENT VISION & MISSION

VISION

To nurture and motivate the upcoming Engineering graduates to become sustainable, punctilious Mechanical Engineers of the nation.

MISSION

- **M1** Provide quality education through well-structured curricula supplemented with practical training and field visits to leading industries.
- **M2** Build state-of-the-art research facilities to enable faculty and students to learn, disseminate knowledge and innovate in their applications.
- **M3** Foster an entrepreneurial mindset and promote consultancy for holistic personality development of students.
- **M4** Impart knowledge for sustainability and eco-friendly environment to achieve effective mechanical engineering solutions.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO 1
Apply knowledge of basic science, engineering principles and interdisciplinary skills to solve real-time engineering problems, making a good impact on industry and society.

PEO 2
Pursue higher education, research, and continuous professional development to stay updated with evolving technologies.

PEO 3
Establish successful careers in industry, government, or entrepreneurship by demonstrating creative skills and managerial capabilities through professional practice.

PEO 4
Contribute to sustainable development by designing energy-efficient and environmentally friendly engineering solutions addressing societal challenges with innovation.

PROGRAM OUTCOMES (POS)

PO1 Engineering Knowledge
Apply mathematics, science, computing and engineering fundamentals to solve complex problems.

PO2 Problem Analysis
Identify, formulate and analyze complex engineering problems with substantiated conclusions.

PO3 Design / Development
Design creative solutions considering health, safety, net-zero carbon, society and environment.

PO4 Investigations
Conduct research-based investigations using design of experiments, modelling and data analysis.

PO5 Engineering Tools
Select and apply modern engineering and IT tools, recognising their limitations.

PO6 Engineer & World
Analyse societal and environmental aspects: sustainability, economy, safety and legal framework.

PO7 Ethics
Apply ethical principles, commit to professional ethics, human values, diversity and national laws.

PO8 Teamwork
Function effectively as individual, member or leader in diverse and multi-disciplinary teams.

PO9 Communication
Communicate effectively; write reports and make presentations across cultural differences.

PO10 Project Management
Apply engineering management and economic decision-making in multidisciplinary environments.

PO11 Life-Long Learning
Prepare for independent, life-long learning and critical thinking amidst technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOS)

PSO 1
Ability to identify, analyze and solve engineering problems using fundamentals and advanced concepts in Design, Thermal and Manufacturing systems.

PSO 2
Ability to apply multidisciplinary knowledge in design and analysis principles for execution of automation in mechanical systems and processes.

PSO 3
Attain excellence in managerial tools and techniques for effective manufacturing and develop leadership skills with ethical practices.

Vol:8 ISSUE 4- 2025

HOD-DESK

MESSAGE

by,
Dr.A.MANOJ BABU,
HOD/Mech Engg.

HOD message:

Greetings!

I am delighted that Dr. MGR University has provided us with the opportunity and vision to support the release of the Newsletter series throughout all quarters of each academic year. This platform serves as a valuable forum for connecting with all stakeholders and fostering a sense of community.

I am especially pleased to see our department releasing the Newsletter for the period of October 2025 to December 2025. Wishing for many more successful editions ahead and an enriching reading experience for all!

Vol:8 ISSUE 4- 2025

DEAN DESK

MESSAGE

by,
Dr.K.RAJAN,
Dean/Mech Engg.

Greetings!

The Newsletter serves as a mirror, reflecting the vibrant activities and achievements of the department. It provides a platform where students from all walks of life can have their voices heard in an inclusive space that embraces and encourages diverse thoughts and perspectives.

I am pleased to see our department releasing its Fourth Quarter Newsletter for 2025. May it successfully fulfil its purpose of informing, inspiring, and connecting our community. Wishing everyone an engaging and insightful read!

Vol:8 ISSUE 4- 2025

MESSAGE

It gives us immense pleasure to be an integral part of this Newsletter—a powerful communication platform designed to meet the needs of the time. It serves as a bridge, delivering key messages about significant events, achievements, and milestones to all concerned.

Beyond being an information channel, the Newsletter fosters a strong sense of belonging among faculty, alumni, and students. Life does not offer rewinds, only flashbacks, and our talented alumni possess a wealth of experience and skills to share with current students through insightful talks and newsletters.

We believe our efforts will be truly meaningful when, after reading these articles, you feel inspired and motivated to contribute even more to future editions. Let's continue this journey of knowledge sharing, collaboration, and growth together!

EDITORIAL BOARD

Vol:8 ISSUE 4- 2025

ACTION CORNER

SNIPPETS FROM PALS AND OUR UNIVERSITY

Oct 2025- Dec 2025			
DATE	**EVENT TITLE**	**SPEAKERS**	**EVENT COORDINATE**
20 November, 2025	Alumni Lecture Series - 26 on From CAD to Career: How Mechanical Engineers are Shaping the Future Across Disciplines	Roshan Prakash, Business Intelligence Lead UK Fuels	
2 October, 2025	ISR Event on Green Hands, Clean Earth: A Sustainable Living Initiative	Dr. A.Manoj babu, Head of the Department, Dr.M.G.R Educational & Research Institute	
9 October, 2025	Alumni Lecture Series - 25 on Engineering Beyond Boundaries: The Role of Mechanical Engineers in Emerging Technologies	Dr. R. Narasimhan, Chief Technology Officer, Dr. M.G.R. ARI Naval & Aerospace Innovation LLP	

PALS: NOVEMBER

EVENT : Three-Day Online Faculty Development Program (FDP) on "AI Impact Across Industries" – Day 2 Sessions
SPEAKERS: Mr. Srinivasan Varadhan (Vice President, Tata Electronics) & Mr. Jegan Fernando (Director & Technopreneur – Future of Energy, TCS)
DATE : 19.11.2025
VENUE : Online via Zoom

Day 2 of the PALS Faculty Development Program on "AI Impact Across Industries" focused on high-tech engineering and utility infrastructure. The first technical session, delivered by Mr. Srinivasan Varadhan from Tata Electronics, comprehensively explored the strategic role of artificial intelligence in the semiconductor industry, focusing on production analytics and automated quality design. The second session was led by Mr. Jegan Fernando from TCS, who highlighted how AI models optimize distribution grids, predict supply demands, and drive sustainable solutions within the energy sector. To preserve continuity, recorded modules and digital feedback systems were deployed to ensure participants met the continuous evaluation requirements for e-certificate eligibility.

ARTICLES CORNER

10 BENEFITS OF STUDYING ABROAD

by,
Mr. Andrew Nallayan,
Asst. Professor/ Mech Engineering.

In the era of rapid technological advancement, industries across the world are undergoing a transformation known as Smart Manufacturing. With the integration of digital technologies, automation, and data analytics, manufacturing processes are becoming more intelligent, efficient, and adaptable. For mechanical engineers and industrial professionals, smart manufacturing represents a shift from traditional production methods to highly connected and data-driven systems.

Manufacturing is no longer limited to machines and assembly lines; it now involves sensors, software, real-time monitoring, and artificial intelligence. This transformation is helping industries improve productivity, reduce waste, and enhance product quality while meeting the growing demands of the global market.

1. From Traditional Manufacturing to Smart Systems

Traditional manufacturing relied heavily on manual monitoring and fixed production processes. While effective, these systems often lacked flexibility and real-time responsiveness. Smart manufacturing introduces digital connectivity into machines and production lines.

Through technologies like sensors and the Internet of Things (IoT), machines can communicate with each other, collect data, and optimize their operations automatically. This enables manufacturers to detect problems early, reduce downtime, and maintain consistent quality throughout the production process.

2. Role of Automation and Robotics

Automation is one of the core elements of smart manufacturing. Industrial robots are widely used in tasks such as welding, assembly, painting, and material handling. These robots can perform repetitive tasks with high precision and speed, reducing human error and increasing productivity.

Advanced robotic systems are also capable of working collaboratively with humans, often referred to as **collaborative robots or cobots**. These machines enhance workplace safety while allowing workers to focus on complex and creative tasks rather than repetitive labour.

3. Data-Driven Decision Making

One of the most powerful aspects of smart manufacturing is the use of **data analytics**. Sensors embedded in machines continuously collect information about temperature, vibration, speed, and other performance parameters.

This data is analysed using advanced software to predict equipment failures, optimize maintenance schedules, and improve overall system efficiency. Predictive maintenance, for example, allows industries to repair machines before they fail, saving both time and operational costs.

4. Additive Manufacturing and Advanced Production Techniques

Another important innovation in modern manufacturing is **additive manufacturing**, commonly known as 3D printing. Unlike traditional methods that remove material through machining, additive manufacturing builds products layer by layer.

This technology reduces material waste, shortens production time, and allows engineers to create complex designs that were previously impossible. Industries such as aerospace, automotive, and healthcare are already using additive manufacturing to produce lightweight components and customized products.

5. Sustainability in Smart Manufacturing

Smart manufacturing also plays a crucial role in promoting environmental sustainability. Energy-efficient machines, optimized production processes, and reduced material waste help industries lower their environmental footprint.

By using digital monitoring systems, manufacturers can track energy consumption and emissions, enabling them to adopt greener practices. This aligns with global sustainability goals and helps industries move toward responsible production.

6. Skills Required for Future Engineers

As industries adopt smart technologies, the role of engineers is evolving. Mechanical engineers are now expected to have knowledge not only in traditional mechanical systems but also in digital technologies such as automation, data analytics, and industrial software.

Students and future engineers can prepare for this transformation by gaining skills in areas such as:

- Computer-aided design (CAD) and simulation
- Robotics and automation
- Data analysis and industrial IoT
- Sustainable manufacturing practices

These skills will help engineers adapt to the demands of modern industries and contribute to technological innovation.

7. The Future of Manufacturing

The future of manufacturing lies in intelligent systems that combine machines, data, and human expertise. Concepts like **Industry 4.0**, digital twins, and AI-driven production are already shaping the factories of tomorrow.

Smart factories will be capable of self-monitoring, self-optimizing, and even self-correcting production processes. This will lead to faster production cycles, higher quality products, and more efficient use of resources.

Conclusion

Smart manufacturing represents a revolutionary shift in the way industries design, produce, and manage products. By integrating automation, digital

"The factories of the future will not just build products—they will build intelligence into every stage of production."

Digital Twin Technology: Transforming the Future of Mechanical Engineering

BY: Mr.R.T.Chander, Asst Professor, Mech Engineering

The rapid advancement of digital technologies is revolutionizing the engineering world. Among the most promising innovations in recent years is **Digital Twin Technology**. A digital twin is a virtual replica of a physical object, system, or process that allows engineers to monitor, analyze, and optimize its performance in real time. For mechanical engineers, this technology is opening new possibilities in design, manufacturing, maintenance, and product lifecycle management.

As industries move toward smarter and more connected systems, digital twins are becoming an essential tool for improving efficiency, reducing operational costs, and enhancing reliability.

Understanding the Concept of Digital Twins

A digital twin is essentially a digital model that mirrors a real-world machine or system. Sensors installed on physical equipment collect real-time data such as temperature, pressure, vibration, and operational speed. This information is transmitted to a digital model where engineers can analyze the performance of the system.

The digital twin allows engineers to simulate different scenarios, detect potential failures, and make improvements without interrupting the actual operation of the machine. This capability makes it an invaluable tool in modern engineering and industrial management.

Applications in Mechanical Engineering

Digital twin technology is widely used across various industries, including aerospace, automotive, energy, and manufacturing. In the automotive sector, engineers use digital twins to simulate vehicle performance and test design

In manufacturing industries, digital twins are used to monitor production lines and optimize machine performance. Engineers can analyze machine behavior and identify inefficiencies or maintenance needs before they cause breakdowns.

Similarly, in the energy sector, digital twins are used to monitor turbines, power plants, and renewable energy systems, ensuring efficient and reliable operation.

Advantages of Digital Twin Technology

The implementation of digital twins offers numerous advantages for engineers and industries. One of the most important benefits is **predictive maintenance**. By analyzing data from sensors, engineers can predict when a machine component is likely to fail and schedule maintenance accordingly.

Another advantage is improved product design. Engineers can test multiple design variations in a virtual environment before manufacturing the final product. This reduces the need for physical prototypes and accelerates the development process.

Digital twins also improve decision-making by providing real-time insights into system performance. Engineers and managers can make data-driven decisions that enhance productivity and operational efficiency.

Challenges in Implementation

Despite its many advantages, the implementation of digital twin technology also presents certain challenges. Developing accurate digital models requires large amounts of data, advanced software, and reliable sensors. Additionally, integrating digital twins with existing industrial systems can be complex and costly.

There is also a growing need for engineers who possess both mechanical knowledge and digital skills such as data analytics, simulation, and programming. Educational institutions must therefore adapt their curricula to prepare students for these emerging technologies.

The Future of Engineering with Digital Twins

The future of digital twin technology is closely linked with advancements in artificial intelligence, cloud computing, and the Internet of Things (IoT). As these technologies evolve, digital twins will become more intelligent and capable of self-learning and self-optimization.In the coming years, entire factories and infrastructure systems may have digital twins that continuously monitor performance and improve operations automatically. This will lead to smarter industries, improved safety, and more efficient use of resources.

Conclusion

Digital twin technology represents a significant step forward in the evolution of mechanical engineering. By bridging the gap between physical systems and digital intelligence, it enables engineers to design better products, optimize operations, and prevent costly failures.

As industries embrace digital transformation, mechanical engineers who understand and utilize digital twin technology will play a crucial role in shaping the future of modern engineering.

"In the digital age, engineering is no longer limited to the physical world — it thrives in the synergy between machines and their digital counterparts."

Predictive Maintenance: The Future of Smart Mechanical Systems

By: Jai Kishore.M, 3rd Yr, Mechanical Engg.

In modern industries, machines and equipment form the backbone of production. From manufacturing plants to power stations, the reliability of mechanical systems directly affects productivity, safety, and profitability. Traditionally, machines were repaired only after a failure occurred or maintained periodically based on fixed schedules. However, with the advancement of modern technology, a new approach called Predictive Maintenance is transforming how industries manage their mechanical systems.

Predictive maintenance uses data, sensors, and advanced analysis to predict when a machine is likely to fail so that maintenance can be performed before the failure actually happens. This innovative approach not only reduces unexpected breakdowns but also improves efficiency and extends the lifespan of equipment.

Understanding Predictive Maintenance:

Predictive maintenance is widely used in industries that rely heavily on complex machinery. In manufacturing plants, it helps monitor motors, pumps, compressors, and conveyor systems. Engineers can track machine performance and take corrective actions before failures disrupt production.

In the energy sector, predictive maintenance is used to monitor turbines, generators, and power plant equipment. Similarly, in the automotive and aerospace industries, engineers analyze performance data to ensure the reliability and safety of critical components.

Even modern transportation systems, such as high-speed trains and aircraft, rely on predictive maintenance techniques to ensure operational safety and efficiency.

Benefits of Predictive Maintenance:

One of the most significant advantages of predictive maintenance is reduced downtime. Unexpected equipment failures can halt production and cause major financial losses. By predicting potential failures, industries can plan maintenance activities without interrupting operations.

Another benefit is cost efficiency. Instead of replacing components on a fixed schedule, maintenance is performed only when necessary. This helps reduce unnecessary maintenance expenses and optimize the use of resources.

Predictive maintenance also improves safety in industrial environments. Detecting faults early prevents dangerous mechanical failures that could lead to accidents or damage to equipment.

Role of Mechanical Engineers:

Mechanical engineers play a vital role in implementing predictive maintenance systems. They are responsible for selecting appropriate sensors, analyzing machine behavior, and interpreting performance data. Their understanding of mechanical systems helps them identify the root causes of potential failures and design effective maintenance strategies.

In addition to traditional mechanical knowledge, engineers today must also develop skills in data analysis, condition monitoring, and industrial automation. These interdisciplinary skills are becoming increasingly important in modern engineering careers.

The Future of Smart Maintenance:

The future of predictive maintenance is closely linked with emerging technologies such as Artificial Intelligence, Internet of Things (IoT), and machine learning. These technologies allow systems to analyze massive amounts of operational data and make highly accurate predictions about machine performance.

Smart factories of the future will use automated systems that continuously monitor equipment health and schedule maintenance activities automatically. This will lead to highly efficient and reliable industrial operations with minimal human intervention.

Conclusion: A Smarter Approach to Machine Reliability

Predictive maintenance represents a significant shift from traditional maintenance practices. By combining mechanical engineering knowledge with digital technologies, industries can prevent failures, improve efficiency, and ensure safer working environments.

For future mechanical engineers, understanding predictive maintenance is essential in adapting to the rapidly evolving industrial landscape. As industries move toward smarter and more connected systems, predictive maintenance will play a key role in ensuring reliability and sustainability.

"The best maintenance is not fixing machines after failure, but preventing failure before it happens."

The Quiet Billionaire: The Story of Chuck Feeney

by, Hari Krishnan D, 4th Yr, Mechanical Engg

In a world where many billionaires are known for their luxurious lifestyles and public fame, there are a few extraordinary individuals who choose a different path. One such remarkable person is Chuck Feeney — a billionaire who quietly gave away almost his entire fortune to improve education, healthcare, and human welfare around the world.

Unlike many wealthy figures, Feeney believed that money should be used to create positive change during one's lifetime. His story is a powerful example of humility, generosity, and the true meaning of success.

From Humble Beginnings to Billionaire

Chuck Feeney was born in 1931 in New Jersey, USA, to a modest Irish-American family. His parents worked hard to support the household, and Feeney grew up understanding the value of simplicity and hard work.

After serving in the U.S. Air Force, he attended college through a government scholarship. It was during this period that he began experimenting with small business ideas, particularly selling duty-free products to travelers. This entrepreneurial spirit eventually led him to co-found the global retail company Duty Free Shoppers in 1960.

The company quickly became highly successful, expanding across airports around the world and generating billions in revenue.

The Secret Philanthropist

Despite his enormous wealth, Feeney lived an extremely simple life. In fact, for many years, the public did not even know that he was a billionaire. The reason was that he had secretly transferred most of his wealth to a charitable foundation called The Atlantic Philanthropies.

Through this foundation, Feeney donated billions of dollars to causes such as education, public health, scientific research, and social justice. His contributions helped build universities, hospitals, and research centres in countries like the United States, Ireland, Australia, Vietnam, and South Africa.

Living a Simple Life

What makes Feeney's story truly unique is his lifestyle. Even as a billionaire, he lived in modest apartments, flew economy class, and did not own luxury cars or expensive houses.

While many wealthy individuals enjoy public recognition, Feeney preferred to remain anonymous. For years, his donations were made quietly without seeking publicity or praise. Only later did the world begin to learn about his extraordinary generosity.

His humble approach to wealth challenged the common perception that success must always be accompanied by extravagance.

Inspiring a Global Movement

Feeney's philosophy of giving inspired many other wealthy individuals to think differently about philanthropy. His actions influenced the creation of initiatives like The Giving Pledge, where billionaires commit to donating a significant portion of their wealth to charitable causes.

By the time his foundation completed its mission in 2020, Feeney had donated more than 8 billion dollars to various social causes. Remarkably, he ended his journey with only a small portion of his wealth left — exactly as he had planned.

A Legacy Beyond Wealth

Chuck Feeney passed away in 2023, but his legacy continues to inspire people across the world. His life teaches an important lesson: wealth is not measured only by what we earn, but also by how we use it to help others.

In an age where many people seek fame and recognition, Feeney proved that true greatness can exist quietly. His story reminds us that generosity, humility, and compassion can leave a lasting impact on society.

Conclusion

The life of Chuck Feeney shows that success is not just about building wealth but about creating meaningful change in the world. By choosing to give away his fortune to improve the lives of millions, he redefined the role of wealth in society.

His journey stands as a powerful reminder that the greatest legacy one can leave behind is not money, but the positive difference made in the lives of others.

"The real purpose of wealth is not to keep it, but to use it to make the world a better place."

My Learning Experience at Dr. M.G.R. University

By: Aravind Kumar
Mechanical Engineering
Batch: 2021 – 2025

College life is one of the most memorable phases in a student's journey. It is a time when knowledge, experiences, friendships, and personal growth come together to shape the future. My time at Dr. M.G.R. Educational and Research Institute as a Mechanical Engineering student has been an incredible journey filled with learning, opportunities, and unforgettable memories.

When I first stepped into the campus, I was filled with curiosity and excitement about what the next few years would bring. Little did I know that this institution would not only help me develop technical knowledge but also build confidence, discipline, and a positive outlook toward life.

A Strong Academic Foundation:

The Mechanical Engineering department at Dr. M.G.R. University provides a strong academic foundation that prepares students for real-world challenges. The well-structured curriculum covers important engineering subjects such as thermodynamics, manufacturing processes, machine design, and fluid mechanics.

Our professors have always encouraged us to understand concepts rather than simply memorizing them. Their dedication to teaching and willingness to guide students has played a major role in strengthening our technical knowledge. Laboratory sessions and practical demonstrations helped us connect theoretical learning with real-life engineering applications.

Learning Beyond the Classroom:

One of the most valuable aspects of my college experience has been the opportunities provided beyond regular academics. Workshops, industrial visits, and technical seminars organized by the department gave us exposure to modern technologies and industry practices.

Participating in technical events and symposiums allowed me to interact with students from other institutions and expand my knowledge. These experiences

Supportive Environment and Friendships:

Another highlight of my college journey has been the supportive environment created by both faculty and fellow students. The friendships formed during these years are truly special. From preparing for exams together to sharing ideas for projects, my friends have been a constant source of motivation and encouragement.

Group projects and collaborative assignments taught us the importance of teamwork and responsibility. These experiences helped us learn how to work effectively with different personalities and perspectives.

Preparing for the Future:

As I progressed through my course, the university also provided guidance for career development. Training programs, guest lectures from industry experts, and placement preparation sessions helped students gain confidence and understand industry expectations.

Working on our final-year project was one of the most rewarding experiences of my academic journey. It allowed us to apply everything we had learned and develop practical engineering solutions. The guidance from our professors during this stage was invaluable.

Gratitude and Final Thoughts:

Looking back at my time at Dr. M.G.R. University, I feel grateful for the opportunities and experiences that helped shape my academic and personal growth.

I sincerely thank:

- The faculty members for their continuous guidance and support.
- My friends and classmates for making every moment enjoyable and memorable.
- My family for encouraging me throughout my journey.
- And the university for providing an inspiring environment for learning and development.

My college journey has been more than just earning a degree—it has been about discovering my abilities, building lifelong friendships, and preparing myself for the challenges of the future.

I will always cherish the memories and lessons gained during my time at Dr. M.G.R. University, and they will continue to guide me in my professional and personal life.

“College is not only about education; it is about discovering who you are and preparing for who you will become.”

PUBLICATIONS

Article

A comprehensive review on application of machine intelligence in additive manufacturing

October 2024 · Turkish Journal of Engineering 9(1)
DOI:10.31127/tuje.1502587

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