

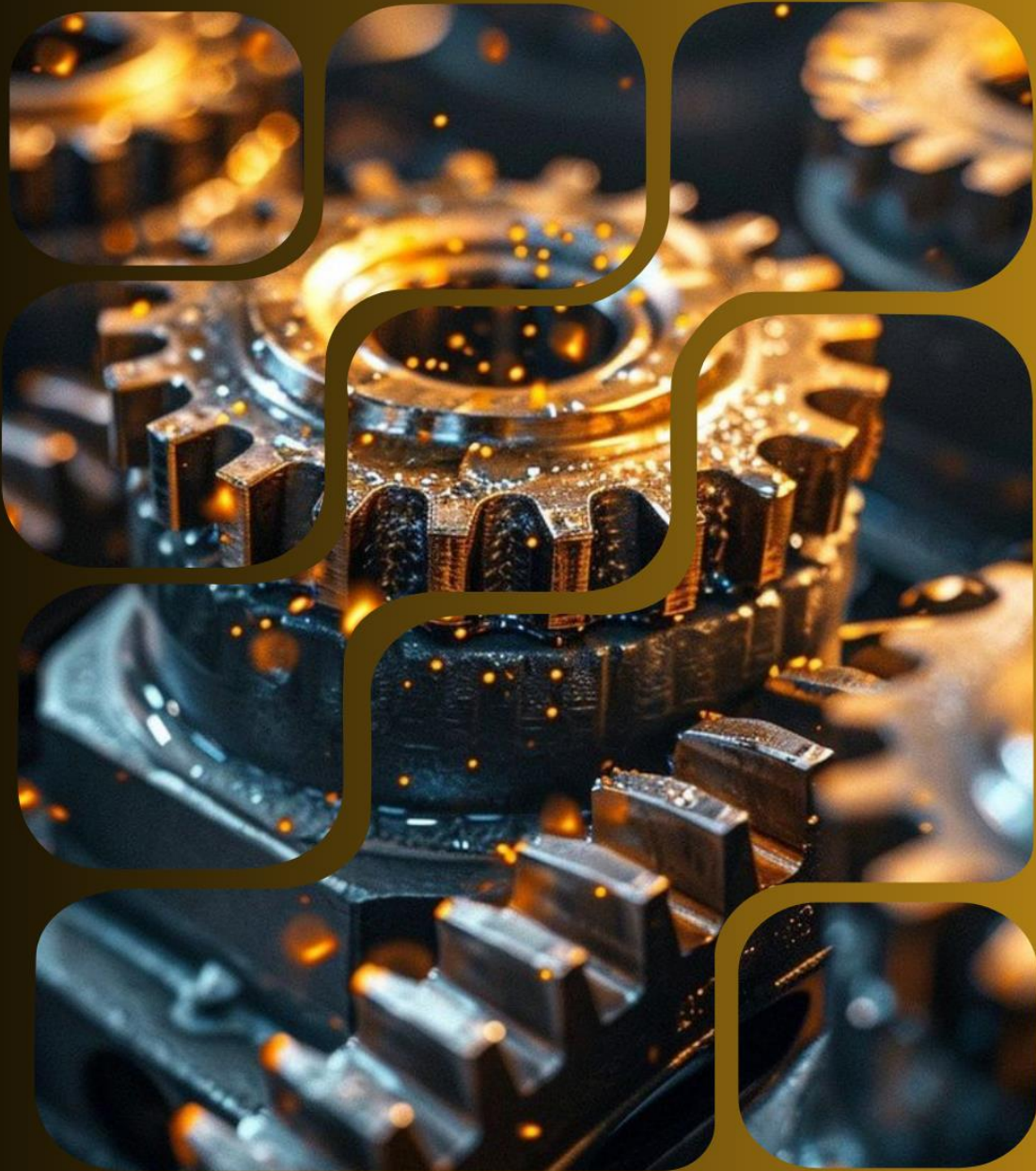
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DEPARTMENT OF
MECHANICAL ENGINEERING
CAPITAL ENGINEERING COLLEGE, KHORDHA

MISSION & VISSION

Vision of CEC

To prepare skilled professionals with innovative, ethical, and entrepreneurial spirit.

Mission of CEC

M-1: Develop Skilled Professionals– Prepare individuals to excel in evolving global industries through training, hands-on experience, collaboration with industries, and continuous learning.

M-2: Promote Innovation- Encourage creative problem-solving through hands-on research and real-world projects.

M-3: Build Ethical Leaders- Instill integrity, inclusivity, and a commitment to social responsibility in all students.

M-4: Inculcate Entrepreneurial Spirit- Prepare individuals into leaders and entrepreneurs for creating and managing companies.

Vision of Department of Mechanical Engineering (Diploma)

To produce competent mechanical professionals for techno-social needs.

Mission of Department of Mechanical Engineering (Diploma)

M1: Impart quality education through training, practice, industry collaboration and continuous learning.

M2: Promote innovation among students and teachers for addressing global challenges through cutting edge technology.

M3: Nurture professionals with strong ethical values and leadership skills through a blend of academic and extracurricular initiatives.

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Mechanical Engineering Department

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From the HOD's Pen



Dear Readers,

It is with great pleasure that I extend my warmest greetings to all readers of **"Pragati Yantra" (Volume-3, Issue-1, 2023-24)**, the official magazine of the **Department of Mechanical Engineering at Capital Engineering College (CEC)**.

This edition of **Pragati Yantra** reflects the remarkable achievements, innovative research, and contributions of our faculty and students. From **cutting-edge technologies like Additive Manufacturing and Smart Materials** to **traditional core domains like Design, Thermal, and Manufacturing**, our students and faculty members have showcased their expertise through insightful articles, research findings, and project highlights.

The **Department of Mechanical Engineering** remains committed to fostering an environment of **creativity, innovation, and technical excellence**. Our collaborations with industry, participation in technical competitions, and emphasis on sustainable solutions further enhance the learning experience of our students, preparing them for successful careers.

I extend my sincere gratitude to the editorial team, faculty, and students who have worked tirelessly to bring this magazine to life. Your dedication and passion for engineering are truly commendable.

I hope this edition inspires all readers and continues to ignite the **spirit of engineering excellence** in our students. Let us all move forward with the **vision of innovation, sustainability, and progress**.

Wishing you all success and a bright future ahead!

Thanks & Regards,
Mr. Rashmi Ranjan Panda,
HOD, Dept. of Mechanical Engineering,
CEC, KHORDHA

From the Editor's Pen



Dear Readers,

It gives me great pleasure to present the inaugural issue of *Pragati Yantra*. This magazine marks the beginning of an exciting journey into the world of digital media. I am eager to witness the remarkable contributions our students will make in the coming years and look forward with anticipation to this year's highlights — ones that will provoke thought, bring joy, and offer glimpses into who we truly are.

Campus magazines are invaluable, not only for capturing the essence and energy of the present but also for serving as a time capsule that future generations can revisit. I am delighted that *Pragati Yantra* is curating literary pieces and reviews showcasing the major contributions of the ME department.

This magazine is truly by the students, of the students, and for the students, fostering their creative expression.

I extend my heartfelt gratitude and congratulations to everyone who contributed articles to spread knowledge and to all those who poured their passion and effort into making this initiative a grand success.

Thanks & Regards,
Saroj Kumar Parida,
Dept. of Mechanical Engineering,
PRAGATI YANTRA

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FACULTY ARTICLES



Tribology: Science of Friction and Wear

by Sidharth Pradhan

Tribology, the study of friction, wear, and lubrication, is a crucial discipline in mechanical engineering. This field, though often overlooked, plays a vital role in extending the lifespan and efficiency of mechanical components. Friction, while necessary for movement, also results in energy losses and material degradation. Thus, understanding and controlling wear mechanisms is essential for designing durable and efficient mechanical systems.

One of the most significant applications of tribology is in the automotive industry, where engine components must withstand high temperatures and extreme pressures. By applying advanced lubrication techniques and developing wear-resistant materials, engineers can significantly enhance the performance and longevity of engines. Similarly, in manufacturing, reducing friction in machinery minimizes energy consumption and operational costs.

Recent advances in tribology focus on nanotechnology, where nano-coatings and lubricants with nanoparticles improve surface interactions at the microscopic level. Researchers are also exploring biomimetic approaches, drawing inspiration from nature to develop self-lubricating surfaces. The continued evolution of tribology will undoubtedly lead to more sustainable and efficient mechanical systems, benefiting industries ranging from aerospace to biomedical engineering.

Green Engineering: Innovations in Eco-friendly Designs

by Debananda Behera

Green engineering is revolutionizing mechanical design by integrating sustainability and environmental responsibility. As industries seek to reduce their carbon footprint, mechanical engineers play a pivotal role in developing innovative, eco-friendly solutions.

Green engineering emphasizes resource efficiency, waste reduction, and environmentally friendly materials. It applies to various mechanical engineering fields, including energy systems, transportation, and manufacturing. By incorporating renewable energy sources, engineers can reduce dependence on fossil fuels and minimize environmental impact.

One of the significant innovations in green engineering is the development of energy-efficient machinery. Advanced materials, such as lightweight composites and biodegradable polymers, help reduce energy consumption while maintaining structural integrity. In the automotive industry, hybrid and electric vehicles (EVs) are leading the way in sustainable transportation. Engineers optimize aerodynamics, battery efficiency, and regenerative braking to enhance EV performance.

Manufacturing processes are also evolving to adopt green engineering principles. Additive manufacturing, or 3D printing, minimizes material waste by producing components layer by layer. Sustainable manufacturing also involves recycling and reusing materials, reducing industrial waste and energy consumption.

The future of green engineering lies in smart technologies and artificial intelligence. AI-driven optimization enhances energy efficiency in industrial processes, while Internet of Things (IoT) devices enable real-time monitoring of energy usage. Engineers are also exploring hydrogen fuel cells and bio-based materials to further advance sustainability.

Autonomous Vehicles and Mechanical Engineering

by Sangram Mahapatra

Autonomous vehicles (AVs) are transforming the automotive industry, integrating mechanical engineering, artificial intelligence, and advanced control systems. As self-driving technology advances, mechanical engineers play a crucial role in designing, testing, and optimizing AV components.

Mechanical engineering in AVs focuses on vehicle dynamics, structural integrity, and energy efficiency. Engineers develop lightweight materials and aerodynamically optimized designs to enhance vehicle performance. Advanced suspension systems ensure smooth operation, while braking and steering mechanisms are designed for precision and safety.

Sensor integration is a critical aspect of AV technology. Mechanical engineers collaborate with software developers to incorporate LiDAR, radar, and camera-based systems, enabling real-time navigation and obstacle detection. The development of fail-safe mechanisms ensures redundancy, enhancing the reliability of autonomous systems.

One of the major challenges in AV development is energy efficiency. Electric and hybrid AVs require optimized powertrain systems to maximize battery life and performance. Engineers focus on regenerative braking, energy-efficient drivetrains, and intelligent energy management to extend vehicle range.

The future of AVs relies on advancements in artificial intelligence, connectivity, and infrastructure. Engineers are working on vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, improving road safety and traffic efficiency. As AV technology matures, mechanical engineers will continue to play a vital role in refining autonomous systems and enhancing their real-world applications.

Finite Element Analysis in Structural Design

by Amit Jain Biswal

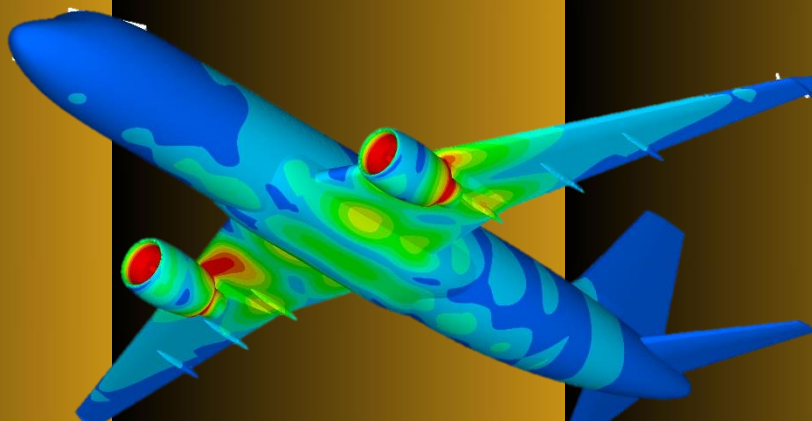
Finite Element Analysis (FEA) is a powerful computational tool used in structural design to evaluate mechanical components under various conditions. It enables engineers to analyze stress, deformation, and thermal effects, ensuring the reliability of mechanical structures.

FEA divides complex structures into smaller elements, allowing for precise simulation of real-world conditions. Engineers apply FEA in various industries, including aerospace, automotive, and civil engineering, to predict component behavior and optimize designs.

One of the key advantages of FEA is its ability to reduce prototyping costs. By simulating structural performance, engineers can identify potential weaknesses and refine designs before physical testing. This accelerates product development and enhances safety.

Advancements in computational power have improved FEA accuracy and efficiency. Integration with artificial intelligence and machine learning enables predictive analysis, allowing engineers to optimize designs automatically. Cloud-based FEA platforms also facilitate collaborative simulations, enhancing research and development processes.

As mechanical engineering evolves, FEA will remain an essential tool in structural design. Future developments will focus on real-time simulations and AI-driven optimizations, ensuring robust and efficient mechanical systems.



Future of Hydropower Technology

by Ananda Kumar Sahoo

Hydropower is a leading renewable energy source, providing clean and sustainable electricity. Advances in hydropower technology are enhancing efficiency, environmental sustainability, and grid integration.

Traditional hydropower plants rely on dams and reservoirs to generate electricity. However, emerging technologies focus on minimizing environmental impact while maximizing energy output. Small-scale hydropower systems, such as run-of-river and micro-hydro installations, provide sustainable solutions for remote areas.

Pumped-storage hydropower (PSH) is gaining attention as an energy storage solution. By pumping water to a higher elevation during low demand and releasing it to generate electricity during peak hours, PSH stabilizes power grids and supports renewable integration.

Turbine innovations are also revolutionizing hydropower efficiency. Advanced turbine designs reduce fish mortality and improve energy conversion rates. Computational fluid dynamics (CFD) simulations help optimize turbine performance and reduce maintenance costs.

The integration of digital technologies, such as AI-driven monitoring and predictive maintenance, enhances hydropower plant operations. Smart grids enable real-time energy distribution, improving reliability and efficiency.

The future of hydropower lies in hybrid renewable energy systems. Combining hydropower with solar and wind energy ensures consistent power generation, addressing the intermittency of other renewables. As mechanical engineers continue to innovate, hydropower will remain a cornerstone of sustainable energy solutions.

A stack of various books and papers in different colors (red, blue, green, yellow, grey) is shown. A green banner with the word 'ARTICLES' is placed over the stack. A circular graphic with three concentric lines is also present, partially overlapping the banner and the books.

STUDENT

ARTICLES

Advances in Material Science for Mechanical Engineers

by Balaram Sahoo, 3rd semester

Materials play a crucial role in shaping the future of mechanical engineering. With ongoing advancements in material science, engineers now have access to innovative materials that offer superior performance, increased strength, and sustainability. These advancements are essential for meeting the evolving demands of industries such as automotive, aerospace, and manufacturing.

One of the most significant breakthroughs is the development of composite materials. Composites combine different materials to create products that are lightweight yet strong. Carbon-fiber-reinforced composites are widely used in aircraft and high-performance vehicles due to their excellent strength-to-weight ratio. Engineers can design more efficient and durable structures by leveraging these materials. Smart materials are another game-changer. These materials can change their properties in response to external stimuli like temperature, pressure, or electric fields. Nanotechnology has revolutionized material science by enabling the development of nanomaterials with extraordinary properties. In the automotive and aerospace industries, advanced materials are making vehicles lighter, faster, and more fuel-efficient. This not only improves performance but also helps reduce emissions, contributing to a cleaner environment. Additive manufacturing, or 3D printing, has further expanded the possibilities for material applications. Engineers can now create intricate designs using advanced materials, speeding up production and enhancing design flexibility.

As mechanical engineering continues to evolve, advancements in material science will play a vital role in driving innovation. Engineers will need to stay updated with emerging materials and their applications to design efficient, sustainable, and cutting-edge solutions.

In conclusion, material science is transforming mechanical engineering. From composites and smart materials to nanotechnology and sustainable solutions, advancements in this field are paving the way for exciting innovations.

Introduction to Industrial Safety Practices

by Hitesh Kumar Panda, 3rd semester

Industrial safety is essential in mechanical engineering environments to ensure the well-being of workers and maintain smooth operations. With heavy machinery, high temperatures, and complex systems at play, adopting proper safety practices can prevent accidents and promote a productive workplace. One of the primary aspects of industrial safety is hazard identification. Engineers must recognize potential risks such as equipment malfunctions, exposure to hazardous materials, and electrical faults. Conducting regular safety assessments helps



identify and mitigate these risks. Personal Protective Equipment (PPE) is a critical component of workplace safety. Depending on the task, workers may need helmets, gloves, safety goggles, ear protection, and respiratory masks. Proper training on the use and maintenance of PPE ensures its effectiveness in protecting workers. Machine safeguarding is another essential practice. Mechanical systems often have moving parts that pose a danger to operators. Installing guards and barriers, as well as providing emergency stop buttons, can significantly reduce the risk of injuries. Employee training is crucial for fostering a culture of safety. Workers should be educated on operating machinery safely, handling hazardous substances, and responding to emergencies. Regular training sessions help reinforce safety protocols and keep workers informed about new safety measures. Fire safety is also a critical consideration. Mechanical engineering environments may involve flammable materials and heat sources. Installing fire detection systems, providing fire extinguishers, and conducting fire drills are essential measures to minimize fire risks. Ergonomics, often overlooked, plays a vital role in preventing injuries. Designing workstations and tasks to reduce physical strain can improve worker comfort and productivity. Proper lifting techniques and the use of mechanical aids can prevent musculoskeletal injuries. Regular equipment maintenance is essential for preventing accidents. Faulty machinery can pose significant risks to workers.

Cryogenics and Its Industrial Applications

by Priyansu Sekhar Mallick, 5th semester

Cryogenics, the science of producing and managing extremely low temperatures, plays a significant role in various industrial applications. Mechanical engineers are at the forefront of harnessing cryogenic technology to innovate and optimize processes in sectors such as healthcare, manufacturing, and aerospace.

One of the most well-known applications of cryogenics is in the field of medicine. Liquid nitrogen, a common cryogenic substance, is used for the preservation of biological samples, such as blood, tissues, and reproductive cells. Cryogenic techniques are also employed in cryosurgery, where extremely cold temperatures are used to destroy abnormal or diseased tissues.

In the aerospace industry, cryogenics is crucial for the storage and handling of liquid fuels like liquid hydrogen and liquid oxygen, which power rockets. The ability to store these fuels at cryogenic temperatures ensures their stability and efficiency during space missions. By reducing the heat generated during machining, cryogenic cooling allows for tighter tolerances and smoother finishes. Environmental applications of cryogenics include the separation and capture of gases from industrial emissions. Cryogenic distillation can effectively separate components such as carbon dioxide from waste gases, contributing to cleaner industrial processes.

Safety considerations are paramount when working with cryogenic systems. Engineers must design equipment and storage systems that can withstand extreme temperatures and prevent hazards such as frostbite and asphyxiation.

Cryogenics offers a wide range of industrial applications that contribute to advancements in healthcare, aerospace, manufacturing, and environmental protection. Mechanical engineers play a crucial role in leveraging cryogenic technology to solve complex challenges and improve industrial processes.

Heat Transfer Methods in Mechanical Engineering

by Rajkishor Padhihari Mallick, 5th semester

Heat transfer is a fundamental concept in mechanical engineering, involving the movement of heat from one body to another. Understanding different heat transfer methods is crucial for designing efficient thermal systems. The three primary methods of heat transfer are conduction, convection, and radiation. Conduction occurs when heat transfers through a solid material due to direct contact. For example, heat flows from a hot metal rod to its cooler end. Convection happens when heat is transferred through fluids, either liquids or gases. This process involves the movement of fluid particles, such as warm air rising and cooler air descending.

Radiation, unlike conduction and convection, does not require a medium. Heat is transferred through electromagnetic waves. The warmth from the sun reaching the Earth is a common example of radiation.

In mechanical systems, heat exchangers play a vital role in managing heat transfer. These devices allow heat to transfer between two fluids without mixing them. They are commonly used in applications like air conditioning, refrigeration, and power plants. Proper insulation is essential for controlling heat transfer. By using materials with low thermal conductivity, engineers can minimize heat loss or gain, improving system efficiency. Advancements in heat transfer technologies are leading to more efficient and environmentally friendly solutions. Innovations such as nanofluids, which enhance thermal conductivity, are becoming increasingly popular.

Understanding and applying heat transfer principles enables mechanical engineers to design better systems for various industries, from automotive to aerospace.

Basics of Thermodynamics in Mechanical Systems

by Roshan Ekka Mallick, 3rd semester

Thermodynamics is the study of energy, heat, and their transformation in mechanical systems. It forms the foundation for understanding how machines work and how energy is utilized.

The first law of thermodynamics, also known as the law of energy conservation, states that energy cannot be created or destroyed but can only change forms. This principle is fundamental in designing engines and power systems.

The second law of thermodynamics introduces the concept of entropy, which measures the disorder of a system. It states that energy transformations are not 100% efficient, and some energy is always lost as waste heat.

Mechanical systems, such as internal combustion engines and refrigeration units, rely on thermodynamic principles to operate. For instance, in an engine, fuel combustion generates heat, which is then converted into mechanical work to power a vehicle.

The Carnot cycle is a theoretical model that defines the most efficient heat engine possible. While no real engine can achieve this level of efficiency, it serves as a benchmark for engineers.

Thermodynamics also plays a crucial role in the design of HVAC (Heating, Ventilation, and Air Conditioning) systems, power plants, and renewable energy systems.

By mastering thermodynamic principles, mechanical engineers can develop more efficient and sustainable systems, contributing to advancements in energy management and conservation.

An Introduction to Turbomachinery

by Dambarudhar Rout, 5th semester

Turbomachinery encompasses machines that transfer energy between a rotor and a fluid, including turbines, compressors, and pumps. These machines are essential in various industries, from power generation to aviation.

Turbines are a type of turbomachinery that extract energy from a fluid flow. Steam turbines, for instance, convert the thermal energy of steam into mechanical work, driving generators to produce electricity.

Compressors, on the other hand, increase the pressure of a fluid, typically a gas. They are widely used in applications such as air conditioning systems and jet engines.

Pumps, another category of turbomachinery, move liquids by converting mechanical energy into fluid energy. They are essential in water supply systems, chemical processing, and oil refineries.

The design and operation of turbomachinery require a deep understanding of fluid dynamics and thermodynamics. Engineers must consider factors such as efficiency, flow rates, and material selection to ensure optimal performance.

Advancements in computational fluid dynamics (CFD) have revolutionized the design process, allowing engineers to simulate and analyze fluid behavior within turbomachinery components.

Turbomachinery plays a vital role in modern engineering, enabling efficient energy conversion and fluid handling. As technology advances, these machines will continue to evolve, contributing to more sustainable and efficient systems.

Hydraulics and Pneumatics in Mechanical Systems

by Ganesh Chandra Pradhan, 5th semester

Hydraulics and pneumatics are essential technologies in mechanical systems, enabling efficient power transmission and control. These systems are widely used in industries like manufacturing, automotive, and aerospace.

Hydraulic systems use pressurized liquids, typically oil, to transmit power. They are known for their ability to handle heavy loads and provide precise control. Common examples include hydraulic presses, lifts, and brakes.

Pneumatic systems, on the other hand, rely on compressed air to transmit power. They are often used in applications requiring rapid and lightweight movements, such as air tools and packaging equipment.

Both systems have their advantages. Hydraulic systems are more powerful and can handle higher loads, making them ideal for heavy-duty applications. Pneumatic systems are cleaner and safer for environments where leaks could be hazardous.

Maintaining these systems is crucial for ensuring their efficiency and longevity. Regular inspections, proper fluid maintenance, and timely repairs help prevent breakdowns.

With advancements in automation and smart technologies, hydraulics and pneumatics are becoming even more sophisticated. Engineers are integrating sensors and control systems to enhance their performance and energy efficiency.

By mastering these technologies, mechanical engineers can design and maintain systems that deliver reliable and precise performance across various industries.

Refrigeration Cycles: A Beginner's Guide

by Chandra Kanta Bhitria, 5th semester

Refrigeration plays a vital role in everyday life, from keeping our food fresh to providing comfortable indoor environments. Understanding the basic refrigeration cycle helps mechanical engineers design and maintain efficient systems.

The refrigeration cycle involves four main components: the compressor, condenser, expansion valve, and evaporator. These components work together to move heat from a low-temperature area to a high-temperature one.

First, the compressor raises the pressure and temperature of the refrigerant gas. The hot, high-pressure gas then moves to the condenser, where it releases heat and becomes a liquid.

Next, the liquid refrigerant passes through the expansion valve, reducing its pressure and temperature. This cold, low-pressure liquid then enters the evaporator, where it absorbs heat from the surrounding environment, cooling the space. Finally, the refrigerant returns to the compressor, and the cycle repeats. Efficiency in refrigeration systems is critical for reducing energy consumption and environmental impact. Engineers are exploring eco-friendly refrigerants and advanced control technologies to achieve these goals.

By understanding and optimizing refrigeration cycles, mechanical engineers contribute to creating sustainable and energy-efficient cooling systems.

Advanced Welding Technologies

by Chandra Kanta Bhitria, 1st semester

Welding is a fundamental process in mechanical engineering, used to join materials together permanently. As technology advances, new welding methods are emerging, offering improved efficiency and strength. One such innovation is laser beam welding. This method uses a focused laser beam to create precise and high-strength welds. It is commonly used in the automotive and aerospace industries for joining thin materials. Friction stir welding is another advanced technique. It involves using a rotating tool to generate heat and join materials without melting them. This method is ideal for aluminum and other lightweight materials. Hybrid welding combines multiple welding processes, such as laser and arc welding, to achieve better results. It offers increased speed and strength, making it suitable for large-scale manufacturing. Automation is playing a significant role in modern welding. Robotic welding systems provide consistent and high-quality welds, reducing the need for manual labor. Ensuring safety in welding operations is essential. Proper protective equipment and ventilation are crucial for preventing injuries and exposure to harmful fumes. As industries continue to demand stronger and lighter materials, advanced welding technologies will remain a key area of innovation for mechanical engineers.

The Role of Bearings in Mechanical Systems

by Lipuna Bhola, 5th semester

Bearings are critical components in mechanical systems, enabling smooth and efficient movement by reducing friction between moving parts. They are used in a wide range of applications, from household appliances to industrial machinery.

There are several types of bearings, including ball bearings, roller bearings, and plain bearings. Ball bearings are versatile and can handle both radial and axial loads. Roller bearings are better suited for heavy loads, while plain bearings are simple and cost-effective.

Bearings work by providing a smooth surface for motion, allowing shafts and other components to rotate or move linearly with minimal resistance. Proper lubrication is essential for reducing friction and wear.

Material selection is crucial for bearing performance. Advanced materials, such as ceramics and polymers, offer improved durability and corrosion resistance.

Regular maintenance and inspection are vital to ensure the longevity of bearings. Detecting and addressing issues early can prevent costly breakdowns.

With the rise of smart technologies, sensor-equipped bearings are becoming popular. These bearings can monitor temperature, vibration, and other parameters, providing real-time data for predictive maintenance.

By understanding and selecting the right bearings, mechanical engineers can enhance the efficiency and reliability of mechanical systems.

Fluid Power Systems: Hydraulic and Pneumatic Advances

by Sonu Jena, 3rd semester

Fluid power systems play a crucial role in modern engineering, providing efficient power transmission and control through hydraulic and pneumatic technologies. Hydraulic systems use pressurized liquids to transmit power. They are known for their high force capability and precise control. Common applications include heavy machinery, industrial presses, and aircraft landing gear. Pneumatic systems, on the other hand, rely on compressed air to transmit power. They are lightweight, fast, and ideal for applications requiring rapid movements, such as automated manufacturing lines.

Recent advancements in fluid power systems include the integration of smart sensors and control systems. These technologies enable real-time monitoring and adjustments, improving system efficiency and reliability. Energy efficiency is a key focus in modern fluid power systems. Engineers are exploring ways to reduce energy consumption by optimizing system design and using energy-efficient components.

Safety is another critical aspect. Proper training, maintenance, and the use of safety devices help prevent accidents and ensure smooth operation.

By staying updated on advancements in fluid power systems, mechanical engineers can design and maintain systems that deliver reliable and efficient performance in various industries.

Renewable Energy Technologies and Mechanical Engineering

by Achyutananda Sahu, 1st semester

Renewable energy technologies are transforming the landscape of mechanical engineering, driving innovations that help reduce environmental impact and reliance on fossil fuels.

Mechanical engineers play a critical role in designing and maintaining systems that harness energy from renewable sources such as solar, wind, geothermal, and hydropower. These technologies require precise mechanical components for efficient energy conversion and distribution.

Solar power systems rely on mechanical mounts and tracking systems to optimize the capture of sunlight. Wind turbines require robust mechanical components, such as gears and bearings, to withstand high rotational forces and varying weather conditions.

Hydropower systems use turbines and pumps to convert the energy of moving water into electricity. Mechanical engineers are responsible for designing these components to maximize efficiency and durability.

The integration of smart technologies and data analytics has further enhanced the performance of renewable energy systems. Predictive maintenance and real-time monitoring help identify and address issues before they impact performance.

By embracing renewable energy technologies, mechanical engineers contribute to building a sustainable and energy-efficient future.

Noise, Vibration, and Harshness (NVH) Control in Automobiles

by Sumanta Behera, 3rd semester

Noise, vibration, and harshness (NVH) control is a critical aspect of automotive design, enhancing the comfort and driving experience for passengers.

NVH refers to the sounds and vibrations generated by a vehicle's engine, transmission, tires, and other components. Excessive noise and vibration can affect vehicle performance and passenger comfort.

Mechanical engineers play a vital role in identifying and mitigating NVH issues. This involves designing components and systems that reduce noise and vibration levels. Techniques such as soundproofing, vibration damping, and the use of advanced materials help achieve this goal.

Computer simulations and testing are essential for analyzing NVH characteristics and optimizing vehicle designs. Engineers use these tools to predict and address potential issues early in the development process.

The rise of electric vehicles (EVs) has introduced new challenges in NVH control. Without the traditional engine noise, other sounds like tire noise and wind resistance become more noticeable.

By focusing on NVH control, mechanical engineers contribute to creating vehicles that deliver a smoother and more enjoyable ride.

MECHVIBES



MECHANICAL POEM

The Soul of the Machine

*Gears that turn, a rhythmic sound,
Power in motion, strength unbound.
In every nut, in every bolt,
Lies the wisdom engineers wrote.*



GREAT QUOTES

Scientists dream about doing great things. Engineers do them.

**James A. Michener*

Engineering is the closest thing to magic that exists in the world.

**Elon Musk*

The engineer has been, and is, a maker of history.

**James Kip Finch*

What we usually consider as impossible are simply engineering problems... there's no law of physics preventing them.

**Michio Kaku*

Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away.

**Antoine de Saint-Exupéry*



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DEPARTMENT OF MECHANICAL ENGINEERING



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