ROBOSTAG

e-The News Bulletin

Sakeshwar Gramin Vikas Seva Sanstha's

Adsul's Technical Campus,

Ahmednagar

Department of Mechanical Engineering

Shri Aniruddha Adsul

Chairman

Dr. P.M .Patil

Principal

Mr. Jaware A. R.

Head of Department

Vision of Institute

To be a most preferred Rural Technical Campus in the region by creating competent multifaceted Engineers and Professionals ready to serve the industry and society at large.

Mission of Institute

To establish state-of-the-art facilities and create a conducive environment for transforming the rural minds into competent, skilled, professional, researchers, technically sound, innovative aptitude, and ethics through value-based education to develop the nation for global competitiveness.

Objectives of Institute

- To provide quality education with futuristic trends in engineering and technology
- To ensure continual improvement in quality management system
- To impart innovative teaching and learning

Vision of Department

To be a premier department in Mechanical engineering to serve the need of industry and society

Mission of Department

M1: To provide state-of-the-art facilities to impart quality education.

M2: To undertake various value-added and add-on courses to make students technically sound and thorough professionals.

M3: To collaborate with the industries and strive to instil the research and problem-solving attitude amongst students and faculty.

M4: To inculcate high moral, ethical values, and spirit of national pride amongst students and faculty.

Program Educational Objectives (PEOs)

PEO1: To prepare Mechanical engineering graduate with standing knowledge of Mathematics, Science, Engineering, Technology, Management, Humanities and various other interdisciplinary subjects for successful career.

PEO2: To equip students with modern tools, technology and advance soft wares for deliberating Engineering solutions.

PEO3: To equip students with broad based knowledge to support the service industry, economic development and to address social and engineering challenges of nation.

PEO4: To inculcate student with leadership skill with high level of integrity and ethical value for team building and team work.

Program Outcomes (POs)

PO-1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering Programs.

PO-2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1: An ability to design solution for thermal, hydraulic systems, design components and production processes that meet the specified needs with team work and management skill for safety, societal and environmental aspects through lifelong learning..

PSO2: Utilize modern computational tools, software tools & hardware required with the proper understanding of all basic technical skills, soft skills in industry

PSO3: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths. Creating innovative career paths.

Silent features of Department:

- **Supportive learning for placement:** Placement learning is immersive and iterative. Support in the form of formative tasks and activities are crucial for student success, whilst being mindful of the need to ensure parity of student workload between modules of the same credit weighting. Placement assistance can offer students professional guidance and support to help them build successful careers. Students who might feel overburdened by the job search process might greatly benefit from placement assistance services.
- **Value added courses:** Value Added courses are career and market oriented, skill-enhancing courses that empower the students beyond their domain of study. The certificate programmers enable them to enrich their capability and enhance their employability. Value added courses are conducted for one week during the semester breaks by department faculty and external trainers.
- **Career oriented Add-On Courses:** Job-oriented courses are training and academic courses that prepare professionals for a particular career field or role. A traditional academic course may provide an overview of a certain topic or area, but a job-oriented course focuses on the knowledge and skills required for a particular job.
- **Teacher as Mentor:** The role of the Mentor Teacher is a complex blend of modeling, coaching, instructing, collaborating, and encouraging as candidates build competency in program standards. Mentor Teachers are expected to support candidates in developing the skills and knowledge to meet these standards.
- **Report writing and Paper Presentation:** A report is a specific form of writing, written concisely and clearly and typically organized around identifying and examining issues, events, or findings from a research investigation. Reports often involve investigating and analyzing a problem and coming up with a solution.
- **Professional Development for Industrial Engagement:** There are three types of employee engagement: **cognitive**, **emotional**, and **physical**. When employees are cognitively engaged, they're committed to their job, when they're physically engaged, they're invested in their work, and when they're emotionally engaged, they have an emotional connection to their work.
- **Personality Development and Soft Skill Training:** Personality Development teaches us how to communicate and display ourselves as having caring skills. It also emphasizes personal management, grooming, health, and nutrition, as well as soft skills. This course educates students on the numerous aspects of self-development. Soft skills comprise pleasant and appealing personality traits as self-confidence, positive attitude, emotional intelligence, social grace, flexibility, friendliness and effective communication skills.

"Mahatma Gandhi a man who never believed in fight, but he always choose what was right."

Gandhi Jayanti is a national festival celebrated in India to mark the birth anniversary of Mohandas Karamchand Gandhi born on 2nd October 1869. He is famously known as Mahatma Gandhi. Mahatma means "Great Soul". He is also known in India as the "Father of the Nation". The day of Gandhi Jayanti is dedicated as a tribute to Mahatma Gandhi. He was a great leader of the Indian Independence Movement. He launched the famous "Quit India Movement" to drive the British out of our country. Mahatma Gandhi followed the principles of Non-violence and peace through his life. This day is also observed as International Day on Non-violence. Mahatma Gandhi was a simple, but a determined person. He had mass following. On the occasion of Gandhi Jayanti, we all thank this great saint for securing freedom for our country.

Donation to Needy Group

Department of Mechanical donated cloths to the orphan age Anandrushi Ashram, Nepti on 21st Oct 2023 by the hands of HoD Mr. Jaware A.R. On 21st October 2023, the Department of Mechanical Engineering organized a charitable event to donate Grocery to the orphanage Anandrushi Ashram located in Nepti.

The donation to Anandrushi Ashram was a successful and fulfilling event, reflecting the Department commitment to social causes and community engagement. It was an opportunity to bring a positive change in the lives of children who need care and support. The event not only provided essential Grocery things but also fostered a sense of empathy and social responsibility among the students. The department looks forward to organizing similar charitable activities in the future to continue making a difference in society.

Plastic Mukti Abhiyan

Mechanical department organized the Plastic Mukti Abhiyan on 11/11/23 in Chas Forest. This activity was done under mechanical department. All the students and staffs gathered in Chas forest at 10:45 a.m. All members contributed in the work for collection of plastic bags, plastic bottles. On that day near about 29 kg plastic was collected. This activity helps the nature to become free from plastic and from plastic pollution.

In the end, the principal addressed and thanked the chief guest (Chas Village), Dean (Student Activity of ATC Chas) as well as teachers and students for coming and participating in that activity giving their precious time. Overall, this was an excellent and glorious event for all.

Also Vice Chairman Mr. Subash Gavali of Chas village thanked all staffs and students for doing Plastic Mukti Abhiyan in Chas forest.

Articles by Students

Hydrogen as Fuel

Hydrogen, the most abundant element in the universe, has emerged as a promising alternative fuel for a sustainable energy future. Its potential to replace fossil fuels stems from its high energy density, zero greenhouse gas emissions at the point of use, and versatility in applications ranging from transportation to power generation. However, widespread adoption faces several technological, economic, and infrastructural challenges. Hydrogen is a colorless, odorless, and highly flammable gas with the highest energy content per unit weight of any known fuel. However, its low volumetric energy density poses storage and transportation challenges. Hydrogen exists in various forms such as gaseous, liquid, and solid-state storage, each with unique advantages and limitations.

Advantages of Hydrogen as Fuel

1. **Environmental Benefits:**
   - Zero emissions at the point of use.
   - Potential to reduce dependence on fossil fuels.
2. **Energy Security:**
   - Diversifies energy sources.
   - Reduces reliance on imported fuels.
3. **Versatility:**
   - Can be used across sectors: transportation, power, and industry.

Challenges in Hydrogen Adoption

1. **Storage and Transportation:**
   - Compressed hydrogen requires high-pressure tanks, while liquid hydrogen requires cryogenic storage at −253°C.
2. **Safety Concerns:**
   - Hydrogen's flammability and small molecular size pose risks of leaks and explosions.

- Bangar Prathamesh

Nano-Mechanics

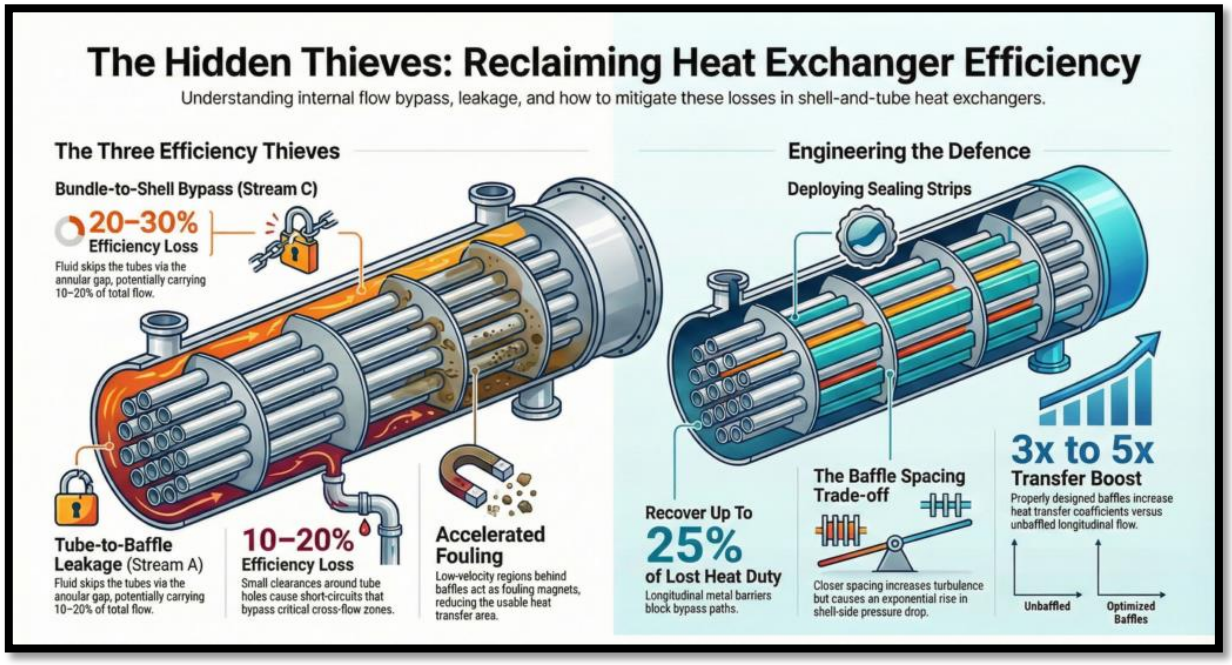
Nano-mechanics is the study of mechanical properties and behaviors of materials at the nanometer scale. This field bridges the gap between quantum mechanics and classical mechanics, offering insights into how materials behave when dimensions shrink to the atomic or molecular level. As a cornerstone of nanotechnology, nano-mechanics has wide-ranging applications in electronics, medicine, materials science, and energy systems.

At the nanoscale, surface-to-volume ratio becomes significant, causing surface forces to dominate over bulk forces. Mechanical properties like strength, stiffness, and elasticity differ drastically from their macro scale counterparts .Quantum phenomena, such as tunneling and quantization, influence mechanical behaviors at small scales. Electrons and atoms exhibit wave-like properties, affecting interactions .Interatomic bonds, including Van der Waals forces and covalent bonds, govern the mechanical properties of nanoscale materials .Classical continuum mechanics often fails to describe nanoscale phenomena, requiring atomistic models like molecular dynamics (MD) simulations.

Nanostructures often exhibit enhanced elastic moduli due to reduced defect densities. Materials at the nanoscale can achieve near-theoretical strength because of minimal flaws and defects. Nano materials exhibit unique plastic deformation mechanisms, such as grain boundary sliding and dislocation starvation.

- Gadakh Vaibhav

Heat Exchangers: Designing for Efficient Heat Transfer



Heat exchangers transfer thermal energy between two fluids without necessarily allowing them to mix. They are fundamental components in power plants, refrigeration systems, automobiles, chemical processing, HVAC equipment and many other mechanical systems. Common heat-exchanger types include double-pipe, shell-and-tube, plate and finned designs. The selection depends on temperature, pressure, fluid properties, available space, maintenance requirements and cost. The basic objective is to transfer the required heat while keeping pressure drop and equipment size within acceptable limits. The heat-transfer rate depends on the overall heat-transfer coefficient, available area and temperature difference. Engineers therefore consider convection on both fluid sides, conduction through the wall and fouling resistance. Flow arrangement is important. Counter-flow exchangers generally maintain a more favourable temperature difference over the length of the exchanger than parallel-flow arrangements. Turbulence can increase heat transfer but may also increase pressure drop and pumping power.

Fouling is a major practical problem. Deposits on heat-transfer surfaces act as additional thermal resistance and reduce performance. Mechanical design must therefore consider cleaning access and suitable materials. In compact heat exchangers, fins and small channels provide large surface area relative to volume. Such designs are useful in vehicle thermal systems and electronics cooling, but they may be more sensitive to blockage and manufacturing tolerances.

Mechanical engineers also need to evaluate thermal expansion, vibration, corrosion and pressure stresses. A heat exchanger is not simply a thermal device; it is a pressure-containing mechanical structure. Improving heat exchangers can increase the efficiency of entire systems. Better thermal design may reduce fuel consumption, compressor power or equipment size. Current research includes microchannel exchangers, advanced surfaces, additive-manufactured geometries and compact thermal systems. This makes heat-transfer equipment a continuing area of innovation in mechanical engineering.

- Chavan Pawan

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We acknowledge the efforts of our editorial team, comprising faculty and students, for their valuable contributions in this publication:

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