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

Dr. M. J. Gitay

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 ensureparity 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 acertain 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 andclearly 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 theirjob, 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:** 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. INTENDED AUDIENCE: Students, Teachers, Professionals, Trainers, Leaders, and Employers.

Industrial Visit to: Bajajpower Equipments Pvt.Ltd.Midc Ahmednagar

Department of Mechanical engineering students visited Bajaj Power Equipment Pvt. Ltd. MIDC Ahmednagar on 07th Oct 2024. The students from the Department of Mechanical Engineering visited the Bajaj Power Equipment Pvt. Ltd. MIDC Ahmednagar. This visit was an excellent opportunity for students to explore the working of boilers, preheater, heat exchangers, economizers..

The visit to the Bajaj Power Equipment Pvt. Ltd. MIDC Ahmednagar was a highly enriching experience for the students of the Mechanical Department. It allowed them to bridge the gap between theoretical learning and practical applications, while also providing exposure to the actual working environment of industry. Whole session was so informative and interesting.

Industrial Visit to:
PRIYADARSHANI MILK PROCESSING PVT. LTD

Department of Mechanical engineering students visited Priyadarshani Milk Processing Pvt. Ltd MIDC Ahmednagar on 13/10/2024. This visit was an excellent opportunity for students to observe and understand advanced technologies and innovations used in industry. The objectives of the industrial visit were to provide students with practical exposure to industrial processes and real-life applications of theoretical concepts. To allow students to observe and understand advanced technologies and innovations used in the industry. To strengthen the connection between academic knowledge and industry practices. To offer interaction opportunities with industry professionals and experts to gain insights into industry operations.

The industrial visit to Priyadarshani Milk Processing Pvt. Ltd. was highly informative and offered students invaluable insights into the practical applications of their classroom knowledge. They gained exposure to advanced technologies, supply chain logistics, quality assurance, and the overall functioning of a modern dairy processing plant.

Student Articles

Friction Stir Welding for Lightweight Structures

Friction stir welding (FSW) is a solid-state joining process in which a rotating tool moves along the interface between materials and generates heat through friction and plastic deformation. Unlike fusion welding, the base materials are not completely melted. A typical FSW tool has a shoulder and a rotating pin. The shoulder produces frictional heating and contains softened material, while the pin stirs the material from the joint region. The tool then travels along the joint, creating a consolidated weld.

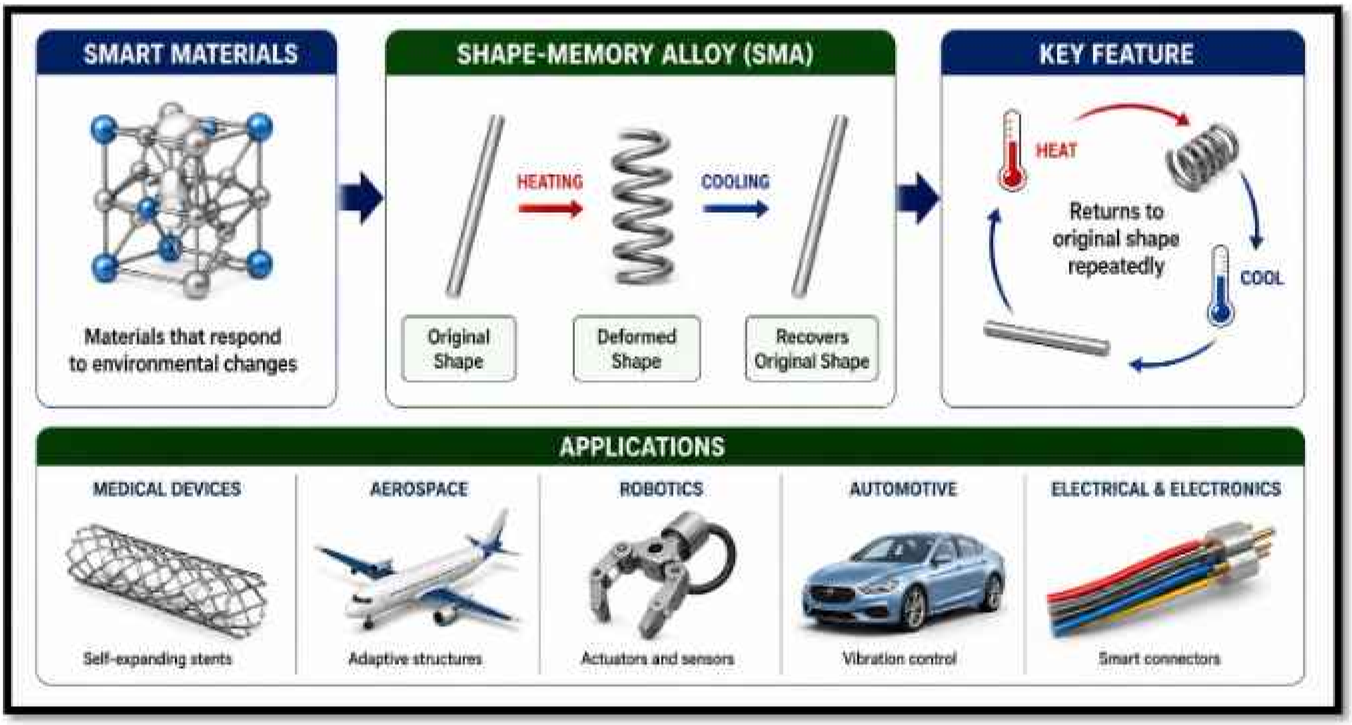
FSW is particularly useful for aluminium alloys and other materials that can be difficult to fusion weld. Because there is no large molten pool, the process can reduce some common fusion-welding defects such as porosity and solidification cracking. Mechanical engineers are interested in FSW for transportation structures, railway components, aerospace applications, shipbuilding and battery enclosures. The process can produce strong joints while reducing distortion in suitable applications.

Important process parameters include tool rotational speed, travel speed, axial force, tool geometry and tilt angle. These parameters influence heat generation, material flow and defect formation. Insufficient heat or poor material flow may produce voids, while excessive heat can affect mechanical properties. The resulting weld contains characteristic regions, including the stir zone, thermo-mechanically affected zone and heat-affected zone. Their microstructures and mechanical properties can differ from the parent material. FSW also supports lightweight design because it can join thin sheets and extrusions effectively. It can be automated using CNC machines or robotic systems, making it suitable for production environments.

The process demonstrates how manufacturing technology can influence mechanical design. Engineers can sometimes redesign a structure around a joining process rather than simply selecting a joining process after the design is completed. Future developments include friction stir processing, hybrid joining, improved tool materials and robotic systems. For mechanical engineering students, FSW is an excellent example of the relationship between materials, heat generation, mechanics and manufacturing.

- Darekar Priyanka Pramod

Smart Materials and Shape-Memory Alloys



Smart materials are materials that respond in a useful and predictable way to changes in their environment. Shape-memory alloys are a well-known example. They can recover a programmed shape when heated after being deformed under suitable conditions. Nickel-titanium alloys are widely studied because they can exhibit both shape-memory and superelastic behaviour. These effects arise from reversible changes in crystal structure rather than conventional elastic deformation.

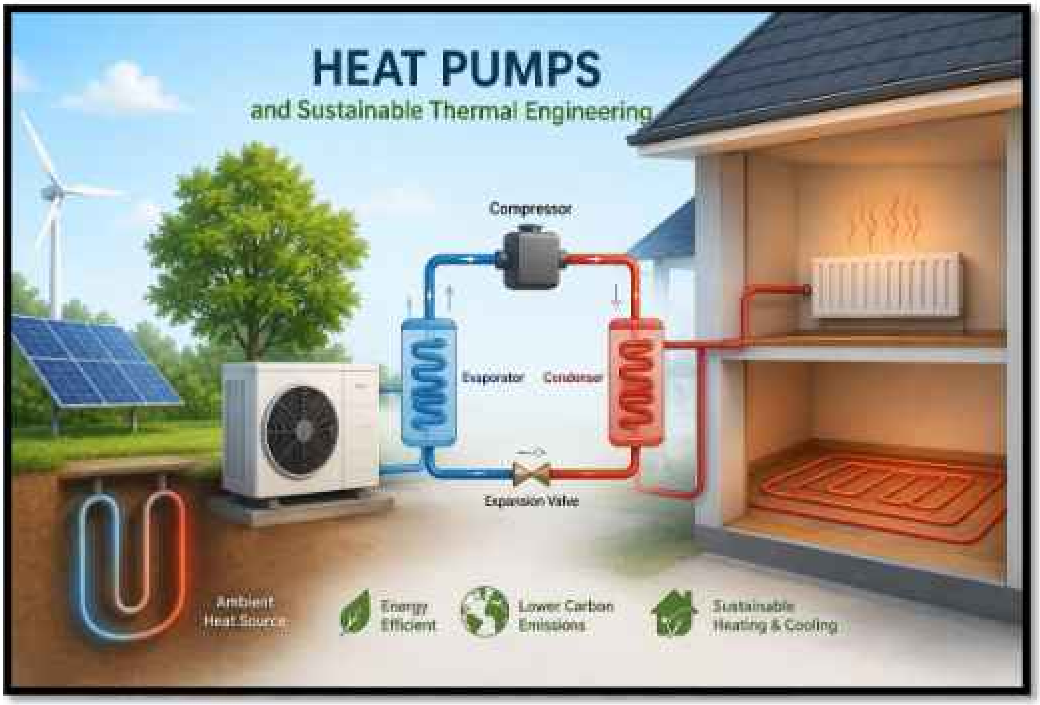
Mechanical engineers can use shape-memory alloys as compact actuators. Instead of a conventional motor, hydraulic cylinder or pneumatic actuator, a wire can contract when heated and produce mechanical motion. Applications include valves, medical devices, robotic mechanisms and thermal actuators. One benefit is high actuation force relative to size. However, the response speed depends on heating and cooling, and repeated cycling can influence performance. The material must therefore be selected and designed according to temperature, stress and fatigue requirements.

Other smart materials include piezoelectric materials, magnetostrictive materials and electroactive polymers. Piezoelectric materials can convert mechanical strain into electrical signals and can also produce deformation when voltage is applied. This makes them useful for sensors, actuators and vibration control. Smart materials can reduce the number of mechanical components required in a system. A conventional mechanism may need springs, motors, gears and sensors, while a smart material can combine sensing or actuation functions into a smaller package.

Mechanical engineers must still consider manufacturing, fatigue, thermal environment and control. A smart material is not a substitute for engineering analysis; it is another tool for solving a design problem. The future of smart materials is closely linked to robotics, aerospace, biomedical devices and adaptive structures. Their ability to sense or respond to environmental changes supports the development of machines that are more compact and functional. Smart materials therefore expand the traditional definition of a mechanical component: material properties themselves can become part of the machine's function.

- Sanap Sarthak Suryabhan

Heat Pumps and Sustainable Thermal Engineering



A heat pump transfers heat from a lower-temperature source to a higher-temperature sink by using external work. Although the principle is familiar from refrigeration systems, modern heat pumps are increasingly important for efficient heating and cooling. A basic vapor-compression heat-pump system contains a compressor, condenser, expansion device and evaporator. The refrigerant absorbs heat at the evaporator, is compressed to a higher pressure and temperature, releases heat at the condenser, and then expands before repeating the cycle.

The performance of a heat pump is often expressed using a coefficient of performance (COP), which compares useful heat delivered with the work supplied. Because the system moves heat rather than generating all of it directly, it can provide more thermal energy than the electrical work supplied under suitable operating conditions. Mechanical engineers optimize compressors, heat exchangers, expansion devices, refrigerant circuits and controls. Heat-transfer area, pressure drop and temperature differences strongly influence performance.

Source temperature is important. Air-source heat pumps experience changing performance as outdoor temperature changes, while ground-source systems can benefit from more stable ground temperatures but may require greater installation effort. Refrigerant selection is also an important engineering consideration. Environmental impact, flammability, pressure level, thermal properties and safety requirements must be considered together.

Heat pumps can be integrated with industrial processes, buildings, water heating and electric vehicles. In industrial applications, high-temperature heat pumps can recover low-grade waste heat and raise it to a useful temperature. The mechanical-engineering challenge is to design systems that provide reliable thermal performance with low energy consumption and manageable cost. Advanced controls, variable-speed compressors and improved heat exchangers are helping systems operate more efficiently across changing loads. Heat pumps demonstrate how thermodynamics can support sustainability. Instead of simply consuming fuel to generate heat, engineers can design systems that move and reuse thermal energy more intelligently.

- Hasanpalli Sainath

PICTURE GALLERY

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