Volume 10 Issue 2 June - 2025

Yaantrika Newsletter

Department of Mechanical Engineering

Vision and Mission of the Institute

Vision

- To be one of the premier institutions of Engineering and Management education through excellence in academics, research, innovation and entrepreneurship with global standards.

Mission

- To impart world class value-based education in Engineering and Management.
- To provide thrust for research activities by establishing centers of excellence in sustainable innovative technologies and collaborate with industries to carry out interdisciplinary research.
- To generate highly skilled and competent manpower with leadership qualities, team spirit and concern for society and environment.
- To nurture organizational culture conducive for faculty to be competent and set higher standards.

Vision and Mission of the Department

Vision

- To be a renowned department in Mechanical Engineering through excellence in academics, research, innovation and entrepreneurship.

Mission

- To impart quality education through dynamic curriculum to build professionals/entrepreneurs to meet societal needs.
- To imbibe research & innovative skills through industry collaborations and Centers of Excellence.
- To inculcate team spirit, leadership qualities and promote self-learning to adapt to ever changing technologies.

Program Educational Objectives (PEOs)

After 2/3 years of graduation, the students will have:

- Demonstrate a strong foundation in mechanical engineering principles and practices to excel in their professional careers and /or pursue advanced studies in engineering.
- Adapt professional ethics as an individual or in a team for multidisciplinary projects demonstrating creativity and leadership qualities
- Solve the problems of social relevance with concern for the environment through research, innovations and lifelong learning

This edition of Yaantrika is dedicated to

Shri Man Mohan Suri

Man Mohan Suri was an Indian Mechanical Engineer and the Director of Central Mechanical Engineering Research Institute (CMERI), Durgapur. He is best known for inventing Suri Transmission, a hydromechanical transmission unit, reported to increase the efficiency of diesel locomotives and he held the patent for the inventions. The technology is known to have led to 36 patent specifications in eleven countries. He also held another patent for his development of Railway truck wheel assembly. He received the fourth highest Indian civilian award of the Padma Shri in 1961. The Council of Scientific and Industrial Research, the apex agency of the Government of India for scientific research, awarded him the Shanti Swarup Bhatnagar Prize for Science and Technology, in 1962.

What's inside.....

B. N. M. Institute of Technology

An Autonomous Institution under VTU

Approved by AICTE, Accredited as grade A institution by NAAC

All eligible branches - CSE, ECE, EEE, ISE & Mech.Engg. are Accredited by NBA for academic years 2018-19 to 2021-22 & valid upto 30.06.2025

URL: www.bnmit.org

Editor's Desk

Dear Readers,

Welcome to the June 2025 issue of ' Yaantrika '

Dear Readers,

Welcome to the June 2025 issue of ***'Yaantrika'***

The team of Yaantrika, wishes to give our readers an intellectually stimulating newsletter. Our endeavour is to reflect the values and quality of our esteemed institution. The present edition of the Newsletter focuses on the activities and achievements of the Department over the past six months along with some interesting articles from our students. We appreciate all those students who have contributed their articles for this issue. It is their attribute of willingness, to put in efforts, share knowledge, concerns and special insights that have made this issue possible. Knowledge is a treasure that appreciates when we share and depreciates when stagnant. So, never stop sharing knowledge and helping others.

Wishing the readers, a happy perusal of the newsletter ***"Yaantrika".***

Editorial Team

'The Department of Mechanical Engineering has been accredited by the National Board of Accreditation (NBA) for the Academic Years 2018 - 19 to 2021 - 22 and valid upto 30.06.2025'

ABOUT MECHANICAL ENGINEERING DEPARTMENT

The Department of Mechanical Engineering was started in the year 2011 with an intake of sixty students. All the laboratories have been established with state-of-the-art equipment. The Department has a team of dedicated and well qualified faculty members, with a blend of rich industrial and academic experience. The faculty members with Master's and Doctorate degree, having specialization in Machine Design, Thermal and Manufacturing Engineering are an asset to the institution and to the students. The Department has an R&D Centre recognized by Visvesvaraya Technological University, Belagavi.

The Department has Toyota Centre of Excellence and 3D Printing Center of Excellence. Toyota COE is a state-of-the-art Centre of Excellence established in association with Toyota Kirloskar Motor, with the distinction of being the first in the country to have such a Centre of Excellence by Toyota company. It has cut sections of Innova and Fortuner Car Engine Systems, wherein the running of the engine can be actually seen. The Center of Excellence also has facilities for students to experience hands-on assembly and dismantling of all the engine parts. 3D Printing COE has been established to provide students with hands-on experience and training in the rapidly evolving field of additive manufacturing. Equipped with advanced 3D printers and scanners, the Centre enables students to explore the diverse applications of 3D printing technology and develop innovative solutions across various industries.

The Department has MoU's with Toyota Kirloskar Motors Pvt. Ltd., Mahatma Gandhi Institute for Renewable Energy and Development (MIRED), Fenfe Metallurgicals, Spectrum Tool Engineers Pvt. Ltd., Maltown Electric Pvt. Ltd. and Kareer Banana Consultants LLP for sustained activities in the area of automobile engineering, renewable energy, metallurgical engineering, manufacturing and electrical engineering and career guidance respectively. The Department has initiated a dedicated Industry-Institute-Interaction Cell (IIIC) to encourage budding entrepreneurs with expert guidance and to provide internship opportunities for students.

The Department also offers Lathe Operator' course (Automotive Sector) under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) an initiative by Automotive Skill Development Council, Ministry of Skill Development and Entrepreneurship, Government of India.

TECHNICAL ARTICLES

Liquefied Natural Gas – The Future of Clean Energy for Transportation

Introduction: A paradigm shift has occurred in the global energy environment in recent years. The pressing need to cut greenhouse gas emissions, manage pollution, and switch to more sustainable energy sources has played a significant role in this change. Liquefied natural gas, or LNG, has become a viable option among the many options being investigated, particularly in the transportation industry. Because of its special qualities, it is a useful and environmentally responsible fuel choice that can lessen the negative effects of the current transportation systems on the environment.

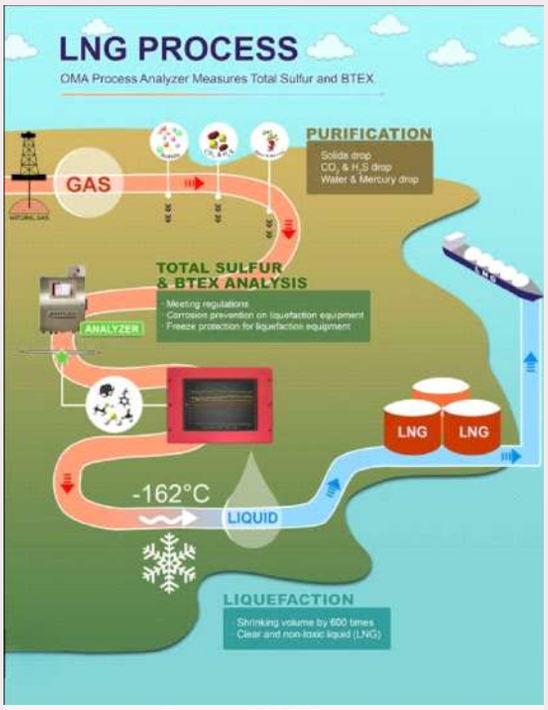

Image: LNG Process

What is LNG? Natural gas, mostly made up of methane (CH?), that has been cooled to about -162°C (-260°F) and turned into a liquid is known as liquefied natural gas, or LNG. The gas's volume is reduced by roughly 600 times by this liquefaction process, which greatly improves its storage and transportation efficiency, particularly over long distances or in locations without pipelines. Under typical air circumstances, the liquefied form is colorless and odorless and is neither poisonous nor corrosive.

LNG emits substantially fewer emissions than conventional fossil fuels due to its cleaner combustion profile. In industries looking to reduce their carbon footprints, this makes it a strategic energy source.

Environmental Impact of LNG: LNG is a bridge to a low-carbon future and a transitional fuel due to its environmental benefits. There are several environmental advantages of using LNG:

Lower Carbon Dioxide Emissions: When compared to diesel, LNG emits up to 30% less CO_2. This makes it ideal for meeting stringent international carbon targets.

- **Reduced Pollutants:** LNG combustion produces fewer nitrogen oxides (No_x), sulfur oxides (SO_x), and particulate matter (PM). These pollutants are major contributors to smog formation, respiratory illness, and acid rain.
- **Cleaner Urban Air:** In densely populated cities, LNG-powered public transport can reduce harmful emissions, thereby improving air quality and public health outcomes.
- **Decreased Noise Pollution:** LNG engines tend to be quieter than diesel engines, contributing to lower noise pollution, particularly in urban settings.

LNG in the Transportation Sector: LNG has found diverse applications across different modes of transport:

1. **Maritime Shipping:** The International marine Organization (IMO) and other new environmental standards have put pressure on the marine sector to adhere to them. An efficient way to lower ship emissions is with LNG. Numerous new boats, such as container ships, Ferries and Bulk carriers are being constructed or modified to run on LNG. LNG is the recommended fuel for Emission Control Areas (ECAs) since it significantly lowers SO_x emissions by almost 100%, NO_x emissions by up to 85%, and PM emissions by 98%.

2. **Road Transport:** Long-distance transportation is using LNG more and more, particularly for heavy-duty vehicles that need a high energy density. Companies like UPS and FedEx are implementing LNG in their fleets with the goal of reducing operating costs and being environmentally conscious. Two instances of how India is adjusting to LNG-powered freight movement are Ashok Leyland's 4923 LNG truck and Tata Motors' 4018 SLC LNG truck.

3. **Public Transit:** As part of their efforts to promote clean public transportation, some local corporations are implementing buses that run on LNG. These buses operate more quietly and provide greater passenger comfort in addition to emitting less pollutants.

4. Inland and Coastal Shipping: An important turning point in clean coastal transportation was reached when the transportation Corporation of India (SCI) launched the M.V. Ganga, the country's first LNG-powered ship.

Image: ***Tata Prima G.35K***

Challenges and Opportunities: Despite LNG's great potential, there are still a number of obstacles to overcome:

1. Infrastructure Gaps: One of the biggest obstacles is the absence of storage facilities and refill stations. Creating a comprehensive network of LNG distribution calls for:

LNG terminals and liquefaction plants

Cryogenic tankers and refueling stations

Trained personnel and safety protocols

2. Higher Upfront Costs: Because of their specific fuel systems and storage tanks, LNG trucks frequently have greater capital expenditures. Nonetheless, good lifecycle economics are frequently the result of cheaper fuel and maintenance costs.

3. Technology Development; Continuous investment in engine technology, fuel efficiency, and pollution control systems is necessary to optimize LNG's advantages. To hasten acceptance, the public and private sectors must fund research and development, standardization, and pilot projects.

Image: Volvo LNG Truck

The Future of LNG

The increase of LNG use is greatly supported by the worldwide trend toward energy security and decarbonization. Important projections include:

The **International Energy Agency (IEA)** anticipates LNG demand in transportation to grow steadily through 2040.

The **U.S. Energy Information Administration (EIA)** projects robust growth in LNG production, particularly from countries like the USA, Qatar, and Australia.

India's National Policy on Biofuels and Natural Gas encourages the development of LNG corridors for freight trucks, especially on national highways.

More sustainable solutions will become accessible as bio-LNG (renewable LNG) technologies advance. This will use methane sources obtained from trash and significantly reduce LNG's carbon intensity.

Image: Ashok Leyland LNG Fuel Truck

Conclusion: One of the main issues facing the modern world is sustainable transportation, and LNG offers a workable and ecologically friendly answer. LNG is a vital bridge fuel that can propel the energy revolution by lowering emissions and promoting economic growth through greener logistics. Governments, businesses, and consumers must work together to ensure its widespread adoption. LNG has the potential to be a key component in creating a cleaner, greener, and more energy-secure future with the right kind of policy backing, infrastructure investment, and technology developments.

References:

www.tatamotors.com
www.ashokleyland.com
www.vecv.in
https://petroleum.nic.in
reuters.com+11niti.gov.in+11mechanicaljournals.com+11.
aimspress.com+9mdpi.com+9itf-oecd.org+9.
mechanicaljournals.com+1niti.gov.in+1.

Tejas V
VIII Semester

Nanotechnology: Engineering the Future at the Smallest Scale

Introduction: The science of working with matter at sizes smaller than 100 nanometers, or nanotechnology, has emerged as a key component of contemporary mechanical engineering innovation. Materials exhibit amazing mechanical, thermal, and chemical capabilities at this microscopic scale that are very different from their bulk forms. These special qualities enable engineers to design systems that are stronger, lighter, and more intelligent, leading to innovations in a variety of sectors, including healthcare and aerospace. This article examines how nanotechnology is revolutionizing mechanical engineering, emphasizing its uses, advancements, and potential future.

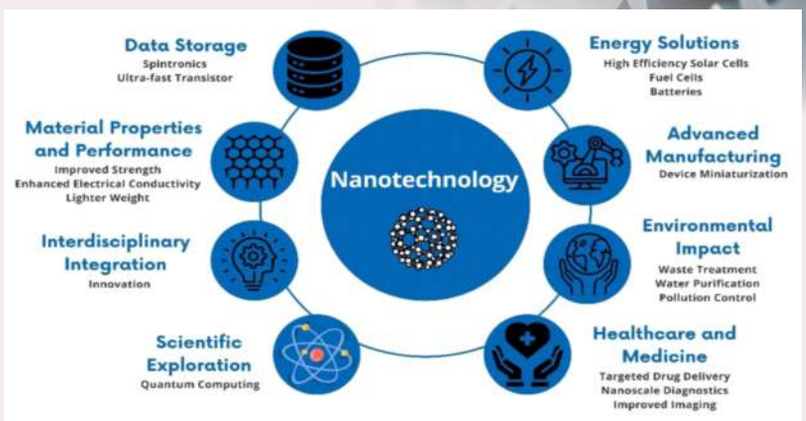

Image: Applications of Nanotechnology

Advanced Nanomaterials & Composites: 1. Carbon Nanotubes (CNTs) and Graphene: These nanoparticles have remarkable durability, outstanding heat conductivity, and remarkable strength-to-weight ratios. They greatly improve mechanical performance when incorporated into metals or polymers, which makes them indispensable for lightweight structural, automotive, and aerospace applications. 2. **Nano-I-Beams:** Nano-I-beams, which are based on the design of conventional I-beams, provide remarkable strength and stiffness at the tiny level. They have potential for uses where low mass and great strength are crucial, such as nano-sensors and nano-heat engines. 3. **Steel Reinforcement with Nanoparticles:** Steel is made safer, stronger, and more resource-efficient by adding copper nanoparticles, which decrease fatigue cracking, and vanadium or molybdenum, which improve weld zones. 4. **Impact-Resistant Nano architectures:** At equivalent weights, structures constructed from nanoscale carbon struts exceed steel or Kevlar in terms of impact resistance.

Surface Treatments & Coatings: 1. Nano coatings for Wear & Corrosion Resistance: Self-healing films and nanostructured ceramic coatings shield structural elements, turbines, and engine parts from heat, corrosion, and wear, increasing service life and lowering maintenance expenses. 2. **Functional Surface Properties:** Surfaces with self-cleaning, hydrophobic, or antibacterial properties are made possible by nanostructuring, which enhances performance in demanding conditions.

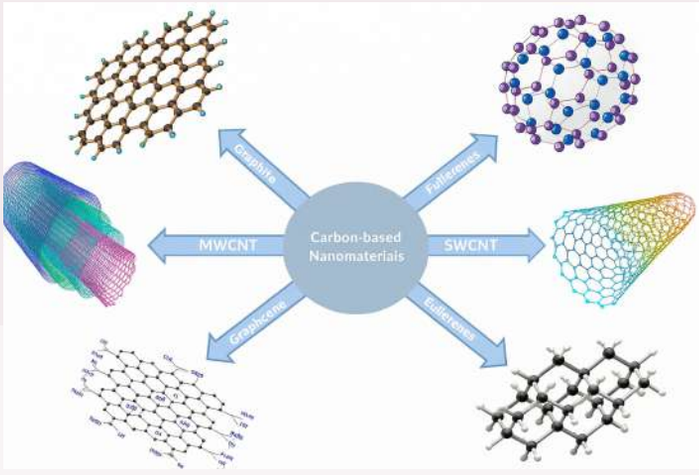

Image: Nano-Enhanced Polymer Composite Materials

Sensors, Actuators & NEMS: 1. Nano electromechanical Systems (NEMS): These gadgets provide ultra-sensitive sensors and actuators by fusing mechanical components with micro electronics. NEMS thick-film cantilevers, for example, are capable of detecting masses as small as a few attograms. 2. **Nano motors & Nano machines:** Nanotubes of carbon Nano actuators: These devices create motion at the nanoscale by using temperature gradients, which opens up new possibilities for targeted delivery systems and nanofluidics. Plasmonic nanomotors: Use light to drive rotation at the nanoscale, opening the door for advancements in solar energy, DNA manipulation, and biomedical technology.

Nanotechnology in Energy & Manufacturing: 1. Nanofluids & Thermal Management: Nanoparticle-containing fluids have excellent heat transmission qualities, which makes them perfect for cooling systems in industrial machinery, electronics, and motors. 2. **Precision Machining & Manufacturing:** For MEMS, sensors, and biomedical devices, tolerances in the nanometer range are crucial, and they are made possible by nano-positioning systems and sophisticated microfabrication equipment.

Biomedical and Regenerative Nanotechnology: 1. Self-Healing Materials: Critical mechanical systems can be made more reliable and require less maintenance because to some nanomaterials' ability to self-heal microdamage.2. **Nano robots & Medical Devices:** Nanorobots provide accurate medication administration and diagnostic services. One prominent example of how mechanical engineering tools are revolutionizing healthcare is the magnetic nanobots created at IISc, Bengaluru, which can navigate through tooth channels to relieve sensitivity. 4. **Light-Activated Nanomachines:** Light-activated molecular drills have the ability to break apart bacterial cells, providing novel ways to treat infections resistant to antibiotics and some types of cancer.

Conclusion: From cutting-edge materials and protective coatings to nanoscale sensors and healthcare advancements, nanotechnology is revolutionizing mechanical engineering on all fronts. Improved performance, previously unheard-of precision, and new opportunities for interdisciplinary applications are all promised. Cost, scalability, and environmental safety issues still exist, but they are gradually being resolved by continued research and technology integration. Nanotechnology is positioned to drive the next wave of high-performance, sustainable engineering solutions as the area develops.

References

- Patel, D. N., Chauhdhari, K. A., Madhikar, M. M., et al. (2024). Nanotechnology in Mechanical Engineering: Applications in Material Strength and Durability. Afr. J. Biomed. Res.
- Mishra, S. B., Kazi, S. S. L., & Kazi, K. S. L. (2024). Nanotechnology's Importance in Mechanical Engineering. Journal of Fluid Mechanics and Mechanical Design.
- Lee, J., & Kim, S. (2023). Advances in Nano-Ceramic Coatings for Enhanced Wear and Corrosion Resistance. Journal of Materials Engineering and Performance.
- Zhao, H., Wang, Y., & Chen, X. (2022). Graphene-Reinforced Metal Matrix Composites: Fabrication Methods and Mechanical Properties. Composites Part B: Engineering.
- https://www.mdpi.com/1424-8247/14/8/707
- https://www.mdpi.com/2073-4360/17/7/893

Vishruth S
VI Semester

Finite Element Analysis: A Gateway to Smarter and Safer Designs

Introduction: Engineers now use a computer program called Finite Element Analysis (FEA) to look at and improve mechanical systems and parts. It lets engineers test digital models of things that might happen in the real world, like stress, strain, heat, vibration, and more, without having to make real prototypes. Because of this, FEA is an important part of modern engineering design because it helps cut costs, make things safer, and speed up the development process for new products. Engineers now use Finite Element Analysis (FEA) to look at mechanical parts and systems and make them better. Engineers can test digital versions of things that could happen in real life, like heat, vibration, stress, and more, without having to make real prototypes. This is why FEA is an important part of modern engineering design: it helps cut costs, make things safer, and make the process of making new products go faster. FEA is a tool used a lot in mechanical engineering to make strong, light, and reliable parts for the auto, aerospace, and manufacturing industries. FEA lets engineers make decisions early in the design process based on data. For example, they can use it to figure out how to best cool an engine or figure out how to evaluate stress on a car's frame.

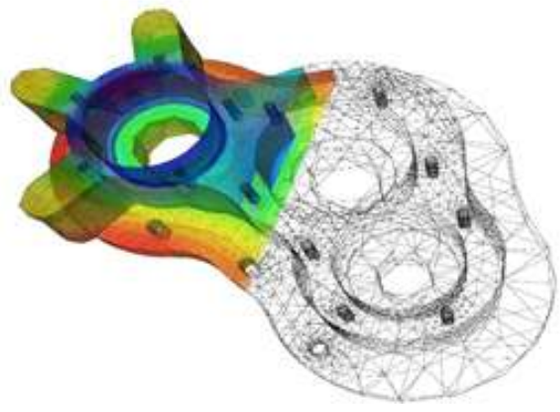

Image: Visual Representation of FEA

For engineers, Finite Element Analysis (FEA) is a numerical method that lets them guess how a real object will react to vibrations, heat, fluid flow, and other physical effects. The idea behind FEA is to take a big, complicated structure and divide it into many smaller, easier parts. These are called finite elements. You can arrange these parts in triangles, quadrilaterals, and other simple shapes. There are mathematical equations for each element that tell us how it acts in certain physical situations.

The whole structure is shown by a network (or mesh) of these parts that are linked at points called nodes. The software solves the governing equations to simulate how each element would behave in real life after the model has been meshed and the material properties and boundary conditions have been set. When engineers add up all the results, they get a full picture of how the structure acts, like whether it bends, deforms, vibrates, or gets too hot when a certain load is put on it.

FEA Methodology : For Finite Element Analysis, there is a set way of doing things that turns a real-world mechanical problem into a digital model that can be solved. There are four main steps in this process:

Preprocessing: The first and most important step is to make a 3D model of the structure or part that needs to be analyzed. Engineers define the geometry and give the material properties (such as Young's modulus, density, thermal conductivity, etc.).

- **Meshing:** Mesh cutting takes the geometry of the model and breaks it up into a set number of smaller parts, or elements. The shapes of these parts can be flat (like beams), round (like shells), or three-dimensional (like bricks or tetrahedrons).

- **Solving:** Once the mesh is made, the software creates and solves the mathematical equations that tell each element what to do. Hooke's Law (for elasticity), Fourier's Law (for heat conduction), and Newton's Laws (for motion) are used to come up with these equations.
- **Postprocessing:** In this final stage, the numerical data is translated into visual outputs such as contour plots, deformation shapes, vector fields, or animations. This helps engineers easily interpret where the structure experiences the most stress, how it deforms under load, or how heat is distributed. These results are then used for validation, redesign, or optimization.

Applications of FEA in Mechanical Engineering

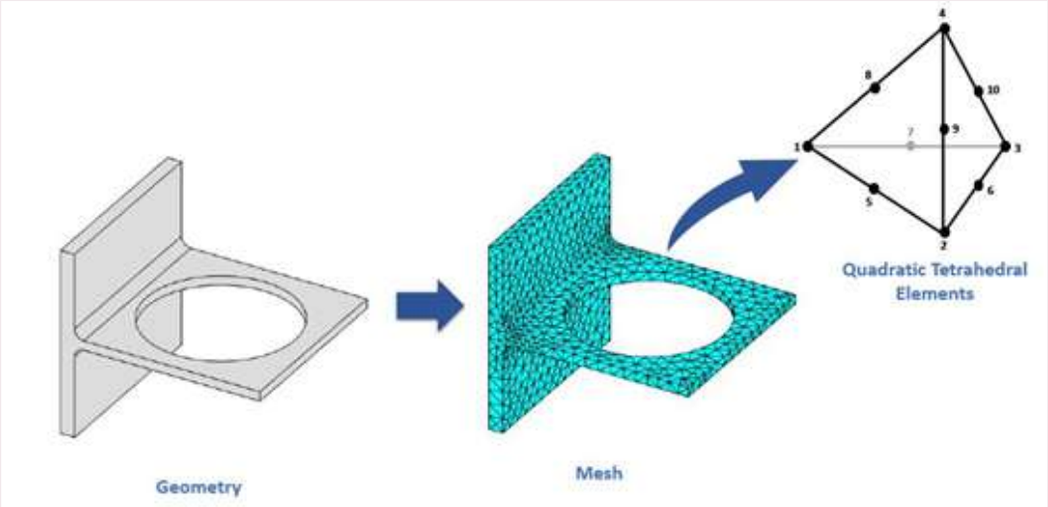

Image: Conversion of Geometry to Finite Element

Finite Element Analysis (FEA) is widely used in mechanical engineering due to its ability to simulate real-world scenarios with high precision. Its applications span across industries like automotive, aerospace, manufacturing, and energy systems. Some key applications include:

Structural Analysis: FEA is used to determine the stress, strain, and deformation in mechanical components such as beams, brackets, shafts, and frames, ensuring they can withstand applied loads without failure.

Thermal Analysis: Engineers use FEA to study heat distribution and thermal stresses in systems like engines, heat exchangers, and electronic cooling units.

Vibration and Modal Analysis: FEA helps predict natural frequencies and vibration modes of mechanical structures, which is vital in preventing resonant failures in machines and vehicles.

Crash and Impact Simulation: In the automotive industry, FEA simulates vehicle crashes to improve safety design by analyzing how a structure deforms and absorbs impact energy.

Fluid-Structure Interaction: For applications like turbines or pressure vessels, FEA can model how fluids interact with solid components, optimizing both safety and efficiency.

predict natural frequencies and vibration modes of mechanical structures, which is vital in preventing resonant failures in machines and vehicles.

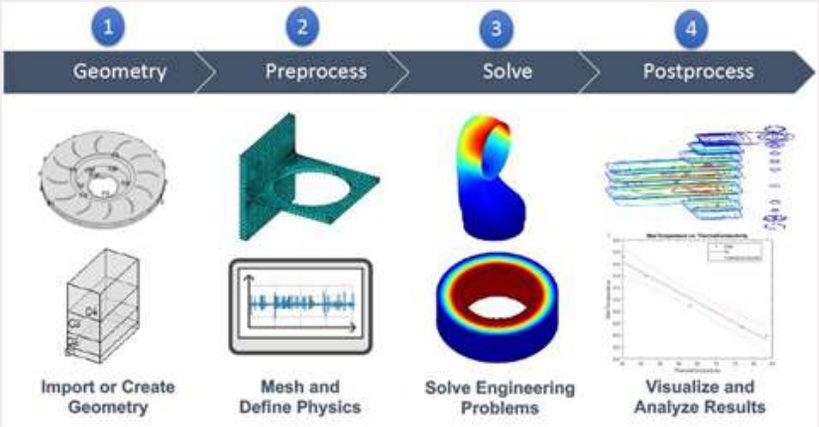

Image: Various Processes of FEA

FEA Tools and Software: Finite Element Analysis is made practical and efficient through various specialized software tools. These software platforms provide user-friendly interfaces, powerful solvers, and post-processing features that allow engineers to simulate, analyze, and optimize their designs. Each tool has its strengths and is chosen based on the complexity of the project, type of analysis required, and industry needs. Below are some of the most commonly used FEA software tools in mechanical engineering:

ANSYS: ANSYS is one of the most powerful and versatile FEA tools available. It supports structural, thermal, fluid, electromagnetic, and coupled physics simulations. ANSYS is widely used in industries and academia due to its accuracy and advanced capabilities for nonlinear, dynamic, and multiphysics problems.

SolidWorks Simulation: Integrated with SolidWorks CAD, this tool is ideal for quick structural and thermal analyses. It's beginner-friendly and often used by design engineers for preliminary validation of parts and assemblies.

Abaqus: Known for its advanced nonlinear capabilities, Abaqus is widely used in aerospace, automotive, and research fields. It

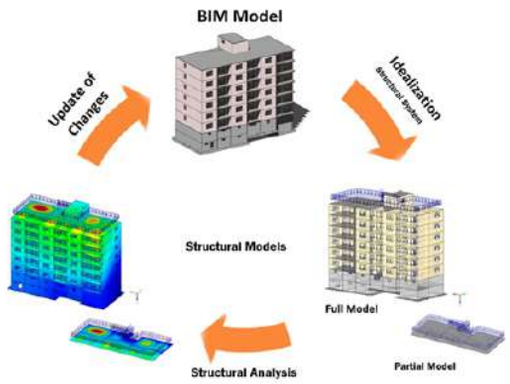

Image: Applications of FEA

Image: Various Softwares used for Analysis

excels in simulations involving plastic deformation, contact problems, and complex material behavior.

Advantages of Finite Element Analysis

Cost-Effective: Reduces the need for multiple physical prototypes, saving money on materials and testing. Time-Saving: Speeds up the design and development process by allowing early virtual testing. Highly Accurate: When set up correctly, FEA provides precise predictions of how a component works. Design Optimization: Engineers can simulate and test multiple design iterations quickly to find the solutions. Risk Reduction: Helps identify weak points and failure risks before production, improving product safety and reliability.

Disadvantages of Finite Element Analysis

Requires Expertise: FEA results are only reliable if the model is properly defined incorrect material properties, boundary conditions, or mesh quality can lead to inaccurate results. Computationally Demanding: Complex models with fine meshes may require powerful computers Not a Replacement for Physical Testing: While FEA is a powerful tool, final validation often still needed. Software Cost: Advanced FEA tools can be expensive and may not be accessible to all institutions or individuals.

Latest Advancements in FEA

- AI and Machine Learning Integration Speeds up simulation by predicting outcomes based on past data. Automates meshing, material behavior prediction, and error detection.

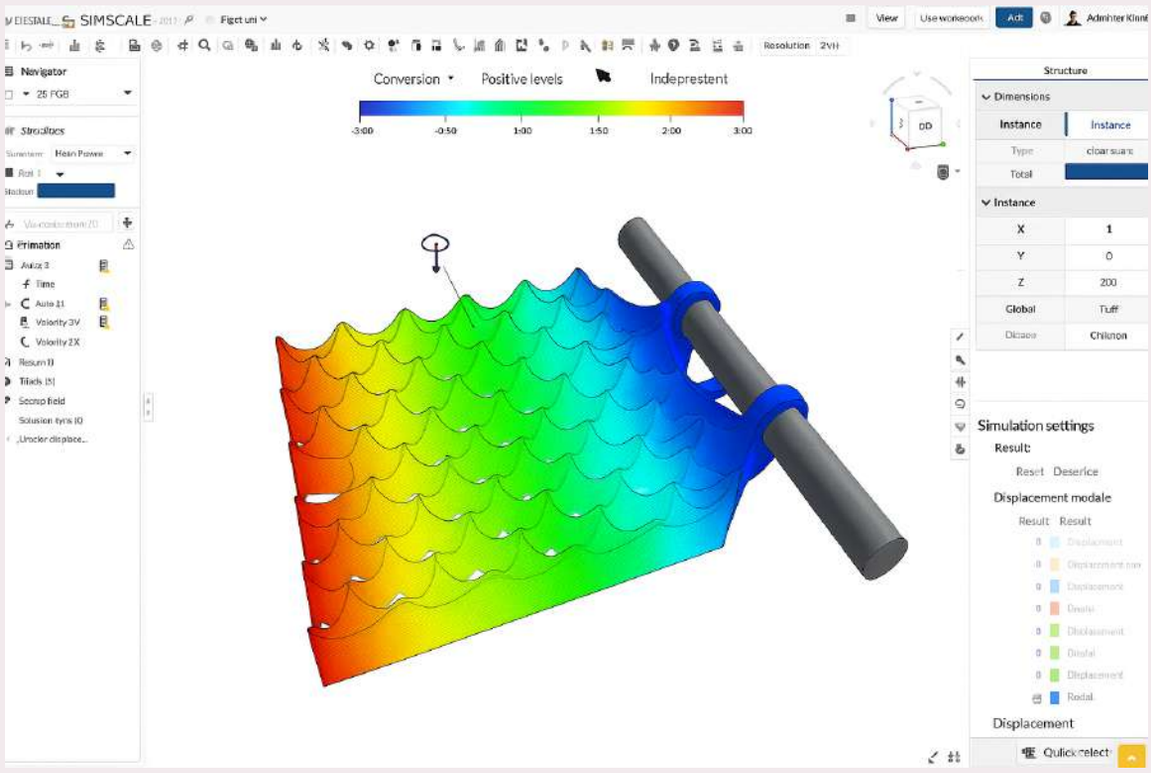

Image: Working of Software

- Cloud-Based FEA Tools like SimScale and ANSYS Cloud allow running simulations without high-end computers. Enables remote collaboration and scalable computing.
- Multiphysics Simulation Combines different physics (thermal, fluid, structural, electrical) in one analysis crucial for simulating real-world systems like EV batteries or aerospace components.
- High-Performance Computing (HPC) and GPU Acceleration Simulates highly complex and large-scale models quickly. Used in crash simulations, biomechanics, and structural analysis. Digital Twin Technology
- FEA powers real-time virtual models (digital twins) of physical assets. Used in smart factories, aerospace, and predictive maintenance.

Conclusion: Finite Element Analysis has revolutionized the engineering design process by providing a virtual testing environment that is both powerful and versatile. Its ability to simulate real-world conditions with accuracy makes it an essential tool in industries where performance, safety, and cost-efficiency matter most. From optimizing mechanical parts to analyzing complex systems under multiple loads, FEA supports engineers in making smarter and faster design decisions. As engineering challenges grow more complex, mastering FEA will continue to be a valuable skill for mechanical engineers. With constant advancements in software and computing power, the future of design is increasingly being shaped in the digital world and FEA is at the heart of that transformation.

- ANSYS Inc. (2024). AI and Machine Learning in Simulation.
- SimScale GmbH. (2024). Cloud-Based Simulation Platform.
- COMSOL Inc. (2023). Multiphysics Modeling and Simulation.
- Altair Engineering. (2023). Topology Optimization with OptiStruct.
- Siemens Digital Industries. (2024). Digital Twin Technology Overview.
- Zienkiewicz, O.C., Taylor, R.L., & Zhu, J.Z. (2013). The Finite Element Method.

Samana
IV Semester

Departmental Activities

Faculty Development Program on 'Recent Advancements & Applications of Artificial Intelligence in Modern Manufacturing'

The Department of Mechanical Engineering, BNMIT, successfully organized a Faculty Development Program (FDP) on "Recent Advancements and Applications of Artificial Intelligence in Modern Manufacturing" from 20th to 24th January 2025. The FDP aimed to provide faculty members with insights into the latest trends, research advancements, and industrial applications of Artificial Intelligence (AI) in manufacturing. This five-day program featured eminent speakers from academia and industry, who shared their expertise on various AI-related topics in manufacturing, automation, robotics, and material science. Additionally, industrial visits were organized to ACE Engineers Pvt. Ltd. and Ashok Leyland Hosur Plant to give participants hands-on exposure to real-world AI implementations in manufacturing.

Inauguration of FDP by Mr. Srikanth Vidapanakal(first from left), Director - AI, Ola Electric Mobility Pvt. Ltd., on 20.01.25

Participants of FDP with employees of Ace Engineers pvt. Ltd., during industrial visit on 23.01.25

Technical Talk on 'Project Life Cycle of a Complex Generator Engine Assembly and Testing Facility'

The guest lecture by Mr. Ramaprasad Srivatsaa, CEO & VP, Automotive and Precision Engineering Industry, was organized on 13.03.2025, which provided invaluable insights into the project life cycle, particularly in the context of setting up a generator engine assembly and testing facility for Cummins India Ltd. He shared his extensive experience in managing large-scale industrial projects, with a special focus on the expansion of production capacity for KV engines from 12 to 24 units. Also, the speaker emphasized the importance of structured project management methodologies, including: Work Breakdown Structure (WBS), Gantt Charts & CPM/PERT Analysis, Agile and Lean Manufacturing Principles, Budgeting and Cost Control and Risk Management Frameworks.

DID YOU KNOW ? 🤔

Sir Frank Whittle, the son of a mechanic, joined the Royal Air Force (RAF) as a boy apprentice and went on to qualify as a pilot at the RAF College in Cranwell. After serving as a fighter pilot and test pilot, he pursued advanced studies at the RAF engineering school and later at the University of Cambridge. As early as 1928, in his senior thesis, Whittle outlined the revolutionary idea of jet propulsion—though it was initially dismissed by the Air Ministry as impractical. Undeterred, he continued refining his vision, and his eventual success in developing the jet engine transformed aviation during World War II and paved the way for the modern era of high-speed air travel.

Seminar on 'Higher Studies Abroad'

The Department of Mechanical Engineering, in collaboration with the Institution of Engineers (India) Students Chapter, organized a seminar on 'Higher Studies Abroad' on 12.3.2025, to provide insights into educational opportunities for students aspiring to pursue advanced studies overseas. The session was delivered by Dr. Karthikeyan, an expert in international education and career development. The primary goal of the seminar was to enlighten students on the prospects of higher education in foreign countries, including aspects such as university selection, scholarships, financial planning, career opportunities, and the challenges involved.

Technical Talk on 'Industrial Use Case of AI in Mechanical Engineering'

The Department of Mechanical Engineering at BNMIT organized an Expert Talk on "Industrial Use Case of AI in Mechanical Engineering" on 12th April 2025, exclusively for the IV Semester Mechanical Engineering students. The objective of the session was to provide students with insight into real-world applications of Artificial Intelligence (AI) in the field of mechanical engineering, and how these technologies are reshaping traditional industrial practices. The resource person for the session was Mr. Akshay P, Team Lead Manager at FAYAT Group, Bangalore, a professional with extensive experience in implementing AI-based solutions in industrial and manufacturing environments. The speaker delivered an informative and engaging session, emphasizing the AI Use Cases in Mechanical Engineering which included- Integration of AI into core mechanical processes such as design, maintenance, and production, Case studies showcasing how AI technologies are utilized in real-time industrial environments.

Technical Talk on 'Design and Development Methodology of a Heavy-Duty Diesel Engine'

Department of Mechanical Engineering at BNM Institute of Technology organized a technical talk titled "Design and Development Methodology of a Heavy-Duty Diesel Engine" on 15th April 2025. The session was delivered by Mr. Yogesh Bolar, an esteemed professional with vast experience in automotive design and R&D. The talk was highly enriching and insightful, offering students a comprehensive overview of the various stages involved in developing a heavy-duty diesel engine. Key areas covered during the session included: Design Engineering Fundamentals, Demands of Modern Engine Design, Concept Design and Prototyping, Testing and Validation Phases, Pre-production and Production Validation Processes

4th semester students with Mr. Yogesh Bolar(second from right) and faculty of ME dept. during talk on 15.4.2025

Industrial Visit

As a part of the industry-institution interaction initiative, the Department of Mechanical Engineering at BNM Institute of Technology organized an industrial visit to Ashok Leyland. The visit took place on 15th April 2025. This industrial visit significantly enriched students' understanding of the engine development processes and exposed them to the latest industrial trends and technologies. This visit tried to bridge the gap between their academic learning and its practical applications in the automotive industry. The experience also inspired students to explore career opportunities in R&D, engine design, and manufacturing sectors

6th semester students with Mr. Bapugowda C M at engine assembly line, Ashok Leyland, Hosur Plant

Mr. Kishore Kumar D, Engine R&D Engineer at Ashok Leyland, addressing 6th semester students during the industrial visit.

A MoU was signed with Cubistry Teck Solutions, Bengaluru, on 23.05.25

Internship-2 Conducted for 5th Semester Students

The Department of Mechanical Engineering, in association with Sheshnag Technologies, successfully organized a three-week Internship Training Program on 'SOLIDWORKS™' from 2nd June to 21st June 2025, for 5th semester students. The program was structured to bridge the gap between academic learning and industry requirements, equipping students with in-demand technical skills aligned with modern engineering practices. The training covered a comprehensive set of modules, including: Fundamentals of Computer-Aided Design (CAD), Sketcher Workbench and Part Modeling, Assembly Modeling and Large Assembly Techniques, Sheet Metal and Surface Modeling, Weldments and Industrial Design Basics, Geometric Dimensioning and Tolerancing (GD&T), Model-Based Definition (MBD). The sessions were conducted by Mr. Balachandra N Pawar, an experienced and renowned trainer from Sheshnag Technologies.

Students of 5th semester with Mr. Nithin and Mr. Balachandra (from left) and faculty of ME dept. during Internship 2

Alumni Talk

Mr. Akshobya J
Design Engineer, RGBSI Pvt. Ltd., Bengaluru

Department of Mechanical Engineering conducted an Alumni talk / technical talk on March 29, 2025, under the banner of Institution of Engineers India (IEI) student chapter. The session was delivered by Mr. Akshobya J, Mechanical Design Engineer, RGBSI Pvt.Ltd. Bengaluru. The speaker emphasized mainly on the key challenges in mechanical design. He addressed the current issues and challenges in design of industrial components and their detailing procedure. Also discussed the historical development of engineering materials, conventional design procedures and the advancements in the sector specific parts/products. He highlighted that low quality products are manufactured in small scale industries due to improper selection criteria or designing environments. His encouraging words motivated our students of 4th and 6th semesters to focus on the core design related courses.

Mr. Mijar Aditya Shenoy
Sales Manager, VJX-Ray Long Island, NY, USA

Department of Mechanical Engineering conducted a Alumni talk / technical talk on April 12, 2025, under the banner of Institution Innovation Council (India) chapter. The session was delivered by Mr. Mijar Adithya Shenoy, Sales Manager/Engineer-Technical, VJX-Ray Long Island, NY, USA. The speaker emphasized mainly on the role of AI tools in executing the day-to-day tasks of a Mechanical Engineers. He addressed about applications of advanced excel and power BI tools for the process planning at production lines. He also discussed regarding the partial automation and automated flow lines, their programming basics with the overview of artificial intelligence techniques. He drew the attention of the students towards the future aspects of work style to be implemented by mechanical engineers, incorporating the procedures of machine learning, cloud computing, data analysis in the routine.

Faculty Achievements

- **Dr. B.S. Anil Kumar,** participated in an online FDP 'The AI beyond Frontier: Recent Breakthroughs and Next-GEN Prospects, organized by Chaitanya Bharathi Institute of Technology, Hyderabad from 21st -25th April 2025.
- **Dr. Raghavendra N.,** participated in an online FDP 'Advanced Materials For Defence and Aerospace Applications organized by Ballari Institute of Technology, Ballari', from 27th January to 1st Febraury 2025.
- **Dr. Harish A.,** participated in an online FDP 'Advancing Hydrogen Energy Frontiers: Artificial Intelligence, E-Mobility and Sustainable Green Technologies, Organized by Electronics and ICT Academy NIT Patna, from 7th -17th April 2025.
- **Mr. Bapugowda C. M.,** participated in an online FDP 'Clean Energy Technologies for Sustainable Development organized by R&D Cell Loknete Gopinathji Munde Institute of Engineering Education and Research Nashik', from 23rd -28th June 2025.
- **Ms. Shwethashree B.,** participated in an online FDP 'Research Structuring & Publication Process' created and Powered by centre for Resarch and Training National Foundation for Entrepreneurship Development Combiatore, from 23rd -27th June 2025.
- **Ms. Madhushree K. J.,** participated in an online FDP '4R's -Repair, Restoration, Rehabilitation and Retrofitting of Structures", from 3rd -8th March 2025.
- **Dr. B S Anil Kumar,** completed a NPTEL course on 'Mechatronics' in April 2025.
- **Dr. D Shivalingappa,** completed a NPTEL course on 'NBA Accreditation and Teaching and Learning in Engineering (NATE)' in April 2025.
- **Dr. Harish A.,** completed a NPTEL course on 'Advance machining processes' in April 2025.
- **Dr. B S Anil Kumar, Dr. Raghavendra N., Dr Harish A.**, have been awarded design patent on 22.05.2025 for Transtibial Prosthetic Leg- Easy Foot .
- **Ms. Shwethashree B,** was co-inventor for a Design patent tiled ' Solar assisted Water Purification Sytem' May 2025.
- **Dr. Raghavendra N.,** coauthored a research paper titled 'Wear Study of Boron Carbide Particulate Reinforced Aluminium Alloy Composites', Journal of The Institution of Engineers (India): Series D Springer, February 2025.
- **Dr. Mahendra Kumara C., Ms. Shwethashreee B.,** and **Ms. Madhushree K. J** authored research paper titled 'Study of Microstructure and Mechanical Behavior of Aluminium Composite reinforced with Boron Nitride', International Journal of Environmental Science, June 2025
- **Dr. N. Raghavendra, Dr. D. Shivalingappa, Ms. K. J. Madhushree** and **Mr. Manu A. S.,** published a book titled 'Basic Engineering Science' Taneesha Publishers in February 2025.
- **Dr. N. Raghavendra, Dr. Harish A., Dr. Mahendrakumar C** and **Vishnu P.,** published book titled 'Innovation and Design thinking' Taneesha Publishers, May 2025.

Student Achievements

- **Pranav Jois** of the 4th semester had the incredible opportunity to participate in the Republic Day Parade 2025. RDC is one of the most prestigious camps in NCC, and through his dedication and hard work, he succeeded in being selected among the very best. He was also fortunate enough to perform in the PM Rally. As part of the cultural team, he got the honor of performing in front of the Chief of Army Staff, Gen. Upendra Dwivedi, PVSM, AVSM, and Raksha Mantri Shri Rajnath Singh. Furthermore, he was privileged to visit the Prime Minister's residence for lunch. He also has received the DDG commendation at Raj Bhavan.
- **Hamsini H S** of IV semester has won a silver medal for One Act Play and a bronze medal for Skit, during 24th VTU Youth festival held from 24th to 27th March 2025.
- **Pradyumna B N** has coauthored a research paper titled 'AI-Based Prediction of Stress Concentration Factor using Neural Networks, International Journal of Innovative Research in Science Engineering and Technology, May 2025.
- **Pradyumna B N, Litheesh Gowda, Rithik R** and **Prithviraj M**., published a research paper 'Solar Integrated Vertical Axis Wind Turbine: A Hybrid Approach', International Research Journal of Engineering and Technology, March 2025.

Pranav Jois, student of 4th semester participated in Republic Day Parade 2025

Hamsini(third from left), a student of 4th semester participated in a skit during state level VTU Youth Festival 2025, which secured third place

PROJECT EXHIBITION HELD ON 12TH APR. 25

8th semester students with their project work during project exhibition held on 12.04.25

(From left) Archisman Deb, Kruthik S J, Prajwal H K and Koushik Gowda, students of 6th semester participated in 24-hour Design challenge hosted at Sairam Institutions, Chennai in Collaboration with ICT Academy, in April 2025

A KALEIDOSCOPE

of "OPEN DAY" held on 26th April 2025

EDITORIAL TEAM

Faculty

Smt. Shwethashree B
Assistant Professor
Dept. of Mechanical Engineering

Prof. Sudeshna Pandey
Assistant Professor
Dept. of Humanities

Students

Hamsini H S	**IV Semester**
Aadya Das	**VI Semester**
Thanush Bharadwaj	**VIII Semester**
Sanjay M	**VIII semester**

For any queries and suggestions, please mail to: shwethashree.b@bnmit.in/hodme@bnmit.in