

CHANDIGARH ENGINEERING COLLEGE CGC, LANDRAN, MOHALI

Building Careers. Transforming lives.







NEWSLETTER

# VOLUME-7

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# VISION OF THE CHANDIGARH ENGINEERING COLLEGE -CGC

To become a leading institute of the country for providing quality technical education in a research based environment for developing competent professionals and successful entrepreneurs.

# MISSION OF THE CHANDIGARH ENGINEERING COLLEGE-CGC

- 1. To provide state of the art infrastructure and engage proficient faculty for enhancing the teaching learning process to deliver quality education.
- 2. To give a conductive environment foe utilising the research abilities to attain new learning for solving industrial problems and societal issues.
- 3. To collaborate with prominent industries for establishing advanced labs and using their expertise to give contemporary industry exposure to the student and faculty.
- 4. To cater opportunities for global exposure through association with foreign universities.
- 5. To extend choice based career options for students in campus placements, entrepreneurship and higher studies through career development program.



### DEPARTMENT OF MECHANICAL ENGINEERING

# Vision of the Department

To emerge as centre of quality education for creating competent mechanical engineers catering to the ever-changing needs of industry and society.

# Mission of the Department

M1: To provide quality education by constantly updating departmental resources and using effective teaching learning methodology.

M2: To promote research practices in the field of mechanical engineering in pursuit of academic excellence and for the benefit of society.

M3: To establish industrial collaborations for imparting contemporary knowledge

to keep pace with the technological challenges in the interdisciplinary and core areas of mechanical engineering.

M4: To provide opportunities to the students for global exposure through international collaborations.

M5: To nurture students through pre-placement training programs to succeed in campus placements and to provide guidance for entrepreneurship and higher studies.



### **EDITOR'S COLUMN**

A newsletter mirrors a department-Its vision and mission. It also highlights events, activities and academic prowess and achievements. The journey of mechanical engineering is an ongoing quest to create a better world. By embracing innovation and sustainability, we can drive positive change and leave a lasting impact on society. As readers and contributors to this magazine, you are part of this transformative journey, and we look forward to witnessing the exciting advancements that lie ahead. We feel extremely overjoyed to share glimpses of the activities taken by our zealous students under the guidance of their faculty as their sailors during the period.



AISHNA MAHAJAN EDITOR-IN-CHIEF MECHNOTIMES

### FROM EDITORIAL'S BOARD

Welcome to our latest edition of Mechnotimes of Mechanical Department Newsletter of Chandigarh Engineering Colleges-CGC,Landran for month October-December 2022. As we delve into the world of engineering and technology, we are reminded of the boundless opportunities and responsibilities that lie ahead. In this editorial, we emphasize the importance of embracing innovation and sustainability to drive progress in the mechanical world. Innovation is the beating heart of the engineering field. From the steam engine to the modern electric vehicle, innovation has shaped the way we live, work, and interact with the world. As mechanical engineers, we are at the forefront of this dynamic transformation, continuously pushing the boundaries of what's possible. The reader will definitely be able to see to paragon vision of the department. We hope that this Culture of releasing the newsletter continue forever and may become quoted example for all to follow.

ANURAAG GILHOTRA (2102424), SEM III SACHIN YADAV (2102444), SEM III NISHANT THAKUR (1902875), SEM VII

### EXPERT TALK

The Department of Mechanical Engineering organized an Expert Lecture on <u>"Principal</u> <u>Stresses and Strains"</u> on October 04, 2022. This lecture was delivered by <u>Dr. Sachin Kumar</u>, Associate Professor, Department of Mechanical Engineering, <u>IIT Ropar</u>. The students were acquainted with the concept of Principal Stresses and Strains in the subject of Strength of Materials. During this lecture, students learned about the process of identifying the section under Principal Stresses and how to modify them. Students were also apprised about various case studies related to failure under the action of principal Stresses.



In practical life, principal stress and strain play a central role in various aspects of mechanical engineering, from material selection and structural analysis to design optimization and failure prediction. Principal stress and strain are fundamental concepts used in mechanical engineering to analyze and design various structures and components. They play a crucial role in understanding the behavior of materials under different loading conditions. These concepts provide critical insights into the behavior of materials and structures and reliable designs for a wide range of applications.

Engineers use principal stress and strain to assess the impact of different manufacturing techniques on material properties. Principal stress and strain analysis is employed in quality control processes to ensure manufactured components meet required standards. Principal stress and strain analysis helps optimize designs and reduce weight while maintaining structural integrity in industries like aerospace and automotive. Understanding principal stress and strain aids in selecting suitable materials for specific applications, ensuring they can withstand the expected stress conditions. Engineers use principal stress and strain to ensure mechanical components can withstand the forces and loads they encounter during operation.

# TECHNICAL EVENTS ORGANIZED DURING PARIVARTAN-2022

The Department of Mechanical Engineering organized three technical events, namely Robo soccer, Weldmaster and CAD modeling during CGC Landran's flagship Techno Cultural Event- Parivartan 2K22 on November 3-4, 2022. These events received an overwhelming response from the students of various colleges and schools who actively participated in these events. The winners of these events were awarded with cash prizes of Rs. 3000 (First position), Rs. 2000 (Second position) and Rs. 1000 (Third position).





CAD modeling enables engineers to perform virtual simulations and analyses, such as finite element analysis (FEA) and computational fluid dynamics (CFD), to validate designs before physical prototypes are built. This helps in identifying potential issues early in the design process, leading to cost savings and improved product performance. CAD models can be directly linked to computer-aided manufacturing (CAM) systems, allowing for seamless transfer of design data to the production process. This integration streamlines manufacturing, reducing errors and ensuring accurate fabrication.

Welding is indispensable for building spacecraft and space habitats, enabling exploration beyond Earth's boundaries. Welding allows for customized designs and adaptability in engineering projects. Engineers can modify and repair structures quickly, making it a versatile choice for both large-scale and small-scale applications. Welding provides a cost-effective manufacturing method compared to other joining techniques like mechanical fastening or adhesives. It reduces material waste and assembly time, resulting in efficient and economical production processes.

Robo soccer games provide an engaging platform for students and enthusiasts to learn and apply concepts in robotics, AI, programming, and mechanical engineering. Participants gain practical skills and problem-solving abilities through designing, building, and programming their robots. Participants in robo soccer games face unique challenges, such as dealing with limited resources, weight constraints, and dynamic environments. Overcoming these challenges fosters creativity and ingenuity in engineering solutions.

### SCOPE OF MECHANICAL ENGINEERING IN UPCOMING 7 YEARS (2023-30)

<u>Mechanical engineering</u>, one of the most seasoned branches of Building, bargains with the plan, fabricating, and upkeep of machines. With the appearance of advanced innovation, the space of this evergreen department of building has amplified and presently its understudies are picking for learning mechanical autonomy, nanotechnology, etc. Presently, you will be pondering, whether students ought to still want mechanical designing or not. The need of work offers to graduates has de-motivated understudies to select mechanical engineering as a stream. But do not stress, Mechanical Build occupations in world are expanding day by day and are advertising profitable openings to gifted mechanical design understudies.

The scope of mechanical engineering incorporates the plan and fabricating of mechanical apparatus, the leading state-of-the-art engine vehicles, and airplane. Besides, the support and testing of such apparatus are key obligations of mechanical engineers. The mechanical building field immerses the concepts of thermodynamics, mechanics, liquids, and auxiliary investigation. Not as it were apparatus and vehicles, mechanical engineers learn to create motors, complex apparatus frameworks, and control hardware. They learn the application of fabric science, material science, and connected science.



With the headway of modern innovation, the scope of mechanical designing has extended and unused space incorporates mechanical technology, geomechanics, nanotechnology, and computer-aided plan. Numerous engineers take mechanical technology and mechatronics, which are the *combinations of mechanical building stream with other streams*.

**<u>Robotics</u>**: Robotics is a combined stream of mechanical building, computer science, and electrical designing. It points at planning and creating automated frameworks. Mechanical building points to create computer frameworks that control automated frameworks. The request for Mechanical technology as a stream is anticipated to develop within the coming decade with the begin of the <u>*AI transformation*</u>.

<u>Mechatronics</u>: Mechatronics is a combination of mechanical building, IT (Data Innovation), and electrical building. The scope of mechatronics ranges from planning complex designing frameworks to preparing mechanization.



With the extending of the scope of mechanical building, mechanical engineers are not constrained to the fabricating industry any longer but moreover they get the opportunity in other businesses with great compensation bundles. But of course, these offices are for talented and capable engineers. According to the global consultancy firm Deloitte, India is expected to create more new opportunities for mechanical engineers in India in the nearby future.

There will be a crevice between the request and supply of mechanical engineers in close future. The request for gifted mechanical engineers will surpass the supply. In spite of the fact that a few unused patterns and advances have been presented, most of the colleges take after the *ancient educational modules*. Hence, there's a need of gifted engineers. The need of abilities and legitimate information in mechanical engineers are tossing challenges to newly graduated engineers to induce a great work. Presently it is the duty of all mechanical building colleges to bridge the aptitude hole. The mechanical engineers ought to be well-versed with modern mechanical information, coding, and communication aptitudes.

With an increasing focus on sustainability and reducing carbon emissions, mechanical engineers will play a crucial role in the development and implementation of renewable energy technologies like solar power, wind energy, and geothermal systems. The automotive industry is rapidly transitioning towards electric and autonomous vehicles. Mechanical engineers will be involved in designing and optimizing electric drivetrains, battery systems, and autonomous vehicle technologies. The scope of mechanical engineering in the upcoming seven years (2023-2030) is promising and diverse, driven by advancements in technology and the demand for sustainable solutions.

Written by: Ronit Bhatia (2102443), SEM III

### INDUSTRY 4.0 AND SMART MANUFACTURING

#### **Introduction**

Industry 4.0 and smart manufacturing have emerged as game-changing concepts that are revolutionizing the world of production. These cutting-edge technologies, driven by the integration of digital systems and automation, are transforming traditional factories into smart, interconnected systems capable of autonomous decision-making. In this article, we will explore the key elements of Industry 4.0 and smart manufacturing, their benefits, and the impact they are having on various industries.

#### **Understanding Industry 4.0**

Industry 4.0 is the fourth industrial revolution, characterized by the fusion of cyber-physical systems, the Internet of Things (IoT), and cloud computing. It emphasizes the interconnectedness of machines, processes, and people through advanced digital technologies.

#### Key Elements of Industry 4.0

- 1. <u>Cyber-Physical Systems (CPS)</u>: CPS involves the integration of physical systems with computer-based algorithms and communication capabilities. These systems enable real-time data exchange and decision-making, making production processes more flexible and efficient.
- 2. <u>Internet of Things (IoT)</u>: IoT connects devices, sensors, and machines through the internet, facilitating seamless data sharing and analysis. This connectivity enhances visibility and control over the manufacturing process.
- 3. <u>Big Data and Analytics</u>: Industry 4.0 generates massive amounts of data through sensors and devices. Big data analytics extract valuable insights, enabling predictive maintenance, process optimization, and informed decision-making.
- 4. <u>Cloud Computing</u>: The cloud serves as a storage and processing hub for vast amounts of data, making it accessible from anywhere. It allows companies to scale their operations and deploy software solutions efficiently.
- 5. <u>Additive Manufacturing (3D Printing)</u>: Additive manufacturing plays a significant role in Industry 4.0 by enabling rapid prototyping, customization, and on-demand production.



#### Smart Manufacturing: The Enabler of Industry 4.0

Smart manufacturing is the application of Industry 4.0 principles in the production environment. It leverages the digital transformation to optimize processes, reduce costs, and enhance product quality.

#### Key Components of Smart Manufacturing

- 1. <u>Advanced Automation</u>: Smart manufacturing relies on automation technologies such as robotics and cobots (collaborative robots) to handle repetitive tasks with precision and speed, freeing up human workers for more complex responsibilities.
- 2. <u>Real-time Data Analytics:</u> Smart manufacturing systems collect real-time data from sensors and machines. Advanced analytics convert this data into actionable insights, leading to improved efficiency and reduced downtime.
- 3. <u>Predictive Maintenance</u>: By using data analytics, smart manufacturing predicts equipment failures before they occur. This allows for proactive maintenance, reducing unplanned downtime and extending the lifespan of machines.
- 4. <u>Digital Twin Technology</u>: A digital twin is a virtual replica of a physical asset or process. Smart manufacturing employs digital twins to simulate and optimize production scenarios before implementation, saving time and resources.
- 5. <u>Human-Machine Collaboration</u>: Smart manufacturing fosters collaboration between human workers and machines. Workers can monitor, control, and interact with automated systems, resulting in improved productivity and job satisfaction.

#### **Impact on Industries**

**Manufacturing:** Smart manufacturing increases productivity, reduces waste, and streamlines supply chains, leading to leaner and more agile production processes.

**Healthcare:** Industry 4.0 technologies are improving patient care through connected medical devices, personalized treatments, and remote healthcare monitoring.

<u>Automotive:</u> Smart manufacturing enables automotive companies to create highly customized vehicles while optimizing production efficiency.

**<u>Aerospace:</u>** In aerospace, Industry 4.0 facilitates predictive maintenance and enhances the safety and reliability of aircraft.



<u>Consumer Electronics</u>: Smart manufacturing allows for rapid prototyping and shorter product development cycles in the electronics industry.

#### **Conclusion**

Industry 4.0 and smart manufacturing are reshaping the landscape of production and offering unparalleled opportunities for businesses to innovate and thrive. With the seamless integration of cyber-physical systems, IoT, big data analytics, and additive manufacturing, industries across the board are embracing the transformational power of smart manufacturing. As we continue to progress in this digital age, the synergy between technology and manufacturing will pave the way for a more efficient, sustainable, and interconnected future.



Written by: Anuraag Gilhotra (2102424), SEM III

# BIOMECHANICS AND MEDICAL DEVICES

#### **Introduction:**

Biomechanics, a field at the intersection of mechanical engineering and healthcare, plays a pivotal role in improving the quality of life for patients. It involves the application of mechanical principles to study the movement and structure of biological systems, leading to innovative medical devices and prosthetics. This article explores the significance of biomechanics in healthcare and highlights some remarkable medical devices that have transformed lives.

#### **Understanding Biomechanics in Healthcare:**

Biomechanics is the study of how mechanical principles influence the function, structure, and motion of living organisms. By understanding how forces interact within the body, biomechanical engineers design devices and treatments that cater to specific medical needs.

The Role of Biomechanics in Medical Devices:

- 1. <u>Prosthetics</u>: Biomechanical engineers work closely with medical professionals to design and create prosthetic limbs. Advanced *prosthetics*, such as robotic arms and computer-controlled legs, emulate natural movements and enhance mobility for amputees, enabling them to lead active lives.
- 2. <u>Orthopedic Implants</u>: Biomechanical engineers develop *orthopedic implants*, such as joint replacements and spinal devices, that restore mobility and alleviate pain for patients suffering from arthritis or injuries.



#### 3. **Biomechanical Rehabilitation Devices:**

Devices like assistive exoskeletons and gait trainers aid patients in regaining mobility after neurological or musculoskeletal impairments, promoting faster rehabilitation.



#### 4. Cardiac Devices:

Biomechanics contributes to the design of cardiac devices like *artificial heart valves* and pacemakers, improving heart function and saving lives.

#### **Importance of Biomechanics in Healthcare:**

1. <u>Personalized Solutions</u>: Biomechanical engineers customize medical devices to fit individual patients, considering their unique anatomical and physiological characteristics, leading to better treatment outcomes.



2. <u>Enhanced Functionality</u>: The fusion of biomechanics and healthcare results in devices that closely mimic natural movements and functions, *allowing patients to experience improved comfort and performance*.

- 3. <u>Improved Quality of Life</u>: By providing patients with advanced medical devices and prosthetics, biomechanics enhances their quality of life, allowing them to participate in daily activities and achieve greater independence.
- 4. <u>Innovative Treatment Options:</u> Biomechanical engineering opens new frontiers in medical treatment, offering innovative solutions that were once <u>deemed impossible</u>, giving hope to patients facing challenging conditions.

#### **Conclusion**

Biomechanics serves as a bridge between mechanical engineering and healthcare, enabling the creation of groundbreaking medical devices and prosthetics. Through the collaboration of engineers, medical professionals, and researchers, patients around the world have gained access to *cutting-edge technologies* that significantly improve their quality of life. The continuous advancements in biomechanics promise a future where patients can thrive and overcome physical limitations, demonstrating the transformative power of technology in healthcare.

Written by: Navneet Singh (2102438), Sem III

# MECHANICAL ENGINEERING JOBS IN IT SECTOR

IT sector's fame stems from its transformative impact on various aspects of modern life, including technology advancements, economic growth, job creation, global connectivity, and innovation. As the world continues to embrace digitalization, the IT sector's prominence is expected to grow further, shaping the future of society and business on a global scale. The IT sector is at the forefront of technological advancements, constantly pushing the boundaries of innovation. From the development of sophisticated software and applications to groundbreaking hardware and infrastructure, IT continuously introduces cutting-edge technologies that shape the way we live and work.



In the IT sector, there are several opportunities for mechanical engineers to apply their skills and expertise. Here are some mechanical jobs in the IT sector:

- 1. <u>CAD Engineer</u>: Mechanical engineers can work as CAD engineers in the IT sector, where they use computer-aided design (CAD) software to create detailed technical drawings and 3D models of products, components, or structures.
- 2. <u>Simulation Engineer</u>: Simulation engineers use specialized software to model and simulate the behavior of mechanical systems or processes. In the IT sector, they may be involved in simulating fluid flow, heat transfer, structural analysis, or other mechanical phenomena.
- 3. <u>Product Design and Development</u>: Mechanical engineers can be part of product design and development teams in the IT sector. They contribute to the design and improvement of various products, ensuring they meet performance, safety, and manufacturability requirements.
- 4. <u>Mechanical Testing and Quality Assurance</u>: Mechanical engineers in the IT sector can be involved in testing and quality assurance of products or components. They conduct performance tests, analyze test data, and ensure products meet industry standards.
- 5. <u>Additive Manufacturing (3D Printing) Engineer</u>: Mechanical engineers with expertise in additive manufacturing can work in the IT sector, contributing to the development and optimization of 3D printing processes and technologies.

- 6. <u>Robotics Engineer</u>: In the IT sector, mechanical engineers can work on robotics projects, designing and developing robotic systems for automation, manufacturing, or other applications.
- 7. <u>HVAC and Building Systems Engineer</u>: Mechanical engineers can be involved in the design and optimization of heating, ventilation, and air conditioning (HVAC) systems for buildings and data centers in the IT sector.
- 8. <u>Energy Efficiency Engineer</u>: Mechanical engineers can work on energy efficiency projects in the IT sector, focusing on improving the energy performance of data centers, server rooms, and other IT infrastructure.



- 9. <u>Materials Engineer</u>: In the IT sector, materials engineers work on selecting and testing materials for various applications, ensuring the reliability and performance of IT products and components.
- 10. **Project Management:** Mechanical engineers with project management skills can lead and oversee engineering projects in the IT sector, ensuring timely and successful project execution.



11. <u>Research and Development</u>: Mechanical engineers in the IT sector can be part of research and development teams, exploring innovative technologies, processes, and solutions to advance the industry.

By: Dheeraj Kumar Gautam (2003059), Sem V