

# CHANDIGARH ENGINEERING COLLEGE CGC, LANDRAN, MOHALI

Building Careers. Transforming lives.





# MECHNOTIMES

NEWSLETTER

# VOLUME-7

### **ISSUE-III**

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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 JANUARY-MARCH 2023. 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.

#### KAUSTUBHA SRIVASTAVA (1902851), SEM VIII

PRATEEK RANJAN (2003076), SEM VI

ANURAAG GILHOTRA (2102424), SEM IV

#### EXPERT TALK

The Department of Mechanical Engineering organized an Expert Lecture on "Innovations in Steel Industries" on 10th February 2023. Dr. V.K. Gupta, Professor, Punjabi University Patiala, delivered this lecture. The students were briefed about the basic processes in steel industries and how latest innovations are adopted by the steel industry. During this lecture, students learned about the process of interpreting the Iron Carbon Phase diagram, processing of steel in industries and alternate fuels used in the steel industry.



The steel industry has adopted advanced steelmaking processes like the Basic Oxygen Furnace (BOF) and Electric Arc Furnace (EAF) that enable more efficient production and reduce energy consumption and emissions. *Innovations in alloy development and microalloying techniques have led to the production of high-strength and specialty steels tailored for specific applications, such as automotive and construction. Continuous casting technology has replaced traditional ingot casting, enabling the continuous production of steel billets or slabs.* This innovation improves product quality, reduces waste, and enhances overall productivity. Innovations in steel composition and processing have led to the development of high-strength and lightweight steels, making them suitable for automotive and aerospace applications, contributing to fuel efficiency and reducing emissions.

### ONE-DAY WORKSHOP ON DESIGN THINKING

The Department of Mechanical Engineering organized one-day workshop on Design thinking on 16th February 2023. Initially a session on design innovation for the safety of pedestrians was conducted. After this session, students were apprised about the process of design and analysis of Bumper system and Human Leg-form using the CAD software, CATIA and Ansys.

Designing allows mechanical engineers to innovate and find creative solutions to complex problems. It involves conceptualizing, planning, and developing new products, systems, or processes that address specific challenges.



Mechanical engineering design often involves collaboration with other disciplines, such as electrical engineering, software engineering, and materials science. Effective design integration ensures seamless functionality and compatibility.

#### MOTIVATIONAL SESSION BY A YOUNG ENTREPRENEUR

The Department of Mechanical Engineering organized a Motivational Session by a young Entrepreneur on 23rd February 2023. <u>Er. Sukant Gupta, who is founder and CEO of Scrapbuk</u> <u>Services Pvt Ltd, Mohali, Punjab</u>, delivered a motivational talk about his Entrepreneurial journey. He interacted with students and apprised them about the challenges and opportunities in the field of Entrepreneurship and Start-ups. The students also discussed their ideas and investment opportunities.



In conclusion, entrepreneurship is a driving force behind innovation, economic growth, and social change. It fuels progress, creates opportunities, and shapes the future of industries and societies. Aspiring entrepreneurs and supportive ecosystems are essential in nurturing a culture of entrepreneurship that benefits individuals, economies, and the world as a whole. Entrepreneurial ventures often transcend borders and have a global impact. They contribute to international trade and collaboration, fostering economic development worldwide.

### INDUSTRIAL VISIT TO HELLA LIGHTING LIMITED

The Department of Mechanical Engineering organized an Industrial Visit to HELLA Lighting Limited for the students on 24th March 2023. During this visit, the students learned about the light bulb and LED light manufacturing process. They visited the Design section, Production section, Assembly Section and Inspection section at HELLA Lighting Limited. The students were apprised about the manufacturing process and special robotic tools used at HELLA Lighting Limited.



A private limited company is a company that is privately held by a limited number of shareholders (maximum 200). It cannot invite the public to subscribe to its shares, and the shares cannot be freely transferred. The liability of the shareholders is limited to the extent of their share capital contribution. laws and regulations can change over time, so it is always advisable to consult with legal and financial experts or refer to the latest official sources for the most up-to-date information regarding company registration and governance in India. Public limited company depends on various factors, including the scale of operations, number of shareholders, and funding requirements.

### INDUSTRIAL VISIT TO GODREJ & BOYCE MFG. CO. LTD.

The Department of Mechanical Engineering organized an Industrial Visit to Godrej & Boyce Mfg. Co. Ltd. for the students on 30th March 2023. During this visit, the students learned about the refrigerator manufacturing process. They visited the Design, Production, Assembly and Inspection section of the refrigerator-manufacturing unit at Godrej & Boyce Mfg. Co. Ltd. The students were apprised about the latest refrigeration technologies, quality control equipment and industrial safety protocols followed at Godrej & Boyce Mfg. Co. Ltd.



The Godrej Group has a strong legacy of ethical business practices, social responsibility, and commitment to sustainability. It has been a significant contributor to India's economic growth and has established a reputation for quality and innovation across its diverse portfolio of businesses. Godrej Group is a prominent Indian conglomerate with a diverse range of businesses operating in various sectors. The company was founded in 1897 by <u>Ardeshir Godrej</u> and is headquartered in Mumbai, India.

#### **INDUSTRY 5.0**

Industry 5.0 is a concept that has been proposed as an extension of the *Industry 4.0 revolution*. It is considered the next phase in the evolution of industrial technology and manufacturing. While Industry 4.0 focused on the integration of digital technologies and automation in manufacturing processes, Industry 5.0 seeks to combine the *capabilities of advanced technologies* with human creativity and craftsmanship.

#### Key features of Industry 5.0 include:

- 1. **Human-Centric Approach**: Industry 5.0 aims to prioritize the role of humans in manufacturing processes, focusing on collaboration between humans and machines. It recognizes the value of human skills, creativity, and problem-solving capabilities.
- 2. **Customization and Personalization**: With the integration of advanced technologies like AI, IoT, and robotics, Industry 5.0 seeks to *enable mass customization and personalized production*, allowing manufacturers to cater to individual customer needs.
- 3. **Decentralization**: Industry 5.0 promotes a more decentralized approach to manufacturing, where production can take place on a smaller scale and closer to the end-users, reducing the need for large centralized factories.
- 4. Sustainable and Ethical Manufacturing: Sustainability and ethical considerations are at the forefront in Industry 5.0, encouraging the use of *environmentally friendly materials*, energy-efficient processes, and responsible supply chain practices.
- 5. **Reskilling and Upskilling**: As technology and processes evolve, Industry 5.0 emphasizes the importance of *continuous education and reskilling* for the workforce to adapt to changing manufacturing practices.
- 6. **Safety and Ergonomics**: The integration of humans and machines in Industry 5.0 emphasizes the importance of *safety and ergonomics* to create a safer and more conducive work environment.



Industry experts and policymakers continue to explore and debate the potential of Industry 5.0 in shaping the future of manufacturing and its impact on the global economy.

Written by: Prateek Ranjan (2003076), Sem VI

#### Applications of Computational Fluid Dynamics in Engineering Design

Computational Fluid Dynamics (CFD) is a powerful tool that is extensively used in engineering design to simulate and analyze fluid flows and heat transfer phenomena. It plays a crucial role in various industries, enabling engineers to make informed design decisions and optimize performance.

CFD is widely used in the aerospace industry to optimize the aerodynamic design of aircraft, spacecraft, and missiles. It helps engineers study airflow patterns, lift, drag, and stability, leading to more fuel-efficient and high-performance vehicles.CFD is applied in the automotive industry to optimize the design of vehicles and components. It aids in studying airflow around cars, optimizing engine cooling, and reducing aerodynamic drag, contributing to improved fuel efficiency and reduced emissions. CFD is used to design and analyze HVAC systems in buildings. It helps engineers understand air distribution, thermal comfort, and indoor air quality, leading to energy-efficient and comfortable building environments. CFD is extensively used in the design of turbomachinery components such as gas turbines, steam turbines, and compressors. It enables engineers to study fluid flow through blades and optimize efficiency and performance.



CFD plays a crucial role in optimizing power generation processes. It is used in the design of gas and steam turbines, combustion systems, and cooling processes in power plants. CFD is applied in the design of electronic components and systems to study and optimize thermal management. It helps in designing efficient cooling solutions for electronic devices to prevent overheating

and ensure reliable operation. CFD is used in ship and marine vehicle design to optimize hull shapes and study hydrodynamic performance. It aids in reducing resistance and improving the efficiency of marine vessels.

CFD is applied in biomedical research to study blood flow in arteries, airflow in lungs, and other fluid dynamics related to human physiology, aiding in medical device design and surgical planning. *CFD is used to optimize the design of wind turbines and hydroelectric generators, studying fluid flow characteristics to improve energy conversion efficiency.* CFD is applied in environmental engineering to study dispersion of pollutants in air and water, helping in environmental impact assessments and pollution control.

Written By: Mayank Sood (2102434), Sem IV

### ROBOTICS IN MEDICINE: TRANSFORMING HEALTHCARE WITH SURGICAL ROBOTS

Robotics in medicine has revolutionized healthcare, particularly in the field of surgery. Surgical robots are advanced machines that assist surgeons in performing complex procedures with precision and accuracy. They have transformed the landscape of healthcare by offering numerous benefits and possibilities. *Surgical robots provide high precision and accuracy, surpassing the capabilities of human hands.* They can perform intricate tasks with minimal tremor, reducing the risk of human error and improving surgical outcomes. Surgical robots enable minimally invasive procedures, where smaller incisions are made, leading to reduced scarring, less pain, and quicker recovery times for patients.



With the integration of robotic technology, surgeons can perform procedures remotely, providing access to specialized care in remote or underserved areas. This telemedicine approach extends healthcare to a broader population. <u>Surgical robots employ advanced imaging and navigation systems, allowing surgeons to visualize and navigate complex anatomical structures with precision, leading to reduced blood loss and fewer complications during <u>surgery.</u></u>



Despite the numerous advantages of surgical robots, challenges remain, such as the high cost of acquiring and maintaining the technology and the need for ongoing training for surgeons and medical staff. However, as technology continues to advance, surgical robots are expected to play an increasingly significant role in transforming healthcare, improving patient care, and shaping the future of surgery

Written by: Yuvraj (2003092), Sem VI

#### <u>Challenges and Innovations in Aerospace</u> Engineering: Pushing the Boundaries of Flight

Aerospace engineering is a field that constantly pushes the boundaries of what is possible in flight and space exploration. While advancements have been remarkable, the journey is not without its challenges. Here are some of the key challenges and innovations in aerospace engineering:

#### **Challenges**

1. Weight Reduction: One of the primary challenges in aerospace engineering is reducing the weight of aircraft and spacecraft while maintaining structural integrity and safety. Lightweight materials and advanced composites are continuously explored to address this challenge.



- 2. Fuel Efficiency and Environmental Impact: Aerospace engineers strive to develop more fuel-efficient engines and propulsion systems to reduce greenhouse gas emissions and minimize the environmental impact of air travel and space missions.
- 3. Supersonic and Hypersonic Flight: Achieving and maintaining supersonic and hypersonic speeds present significant technical challenges, including aerodynamic heating, shockwaves, and structural integrity at high velocities.



- 4. **Noise Reduction**: The noise generated during take-off and landing is a concern for airports and surrounding communities. Engineers work on noise reduction technologies to improve the overall aviation experience.
- 5. **Space Debris and Sustainability**: The increasing number of satellites and space missions have led to a growing concern about space debris. Aerospace engineers are exploring ways to address this issue and ensure the long-term sustainability of space exploration.
- 6. **Human Spaceflight Safety**: Ensuring the safety of astronauts during human spaceflight missions remains a top priority. Engineers continuously refine life support systems, radiation shielding, and emergency protocols.



7. Autonomous Systems and Artificial Intelligence: Integrating autonomous systems and AI into aircraft and spacecraft brings both opportunities and challenges related to safety, reliability, and human-machine interaction.

#### <u>Innovation</u>

- 1. Electric and Hybrid Propulsion: Aerospace engineers are exploring electric and hybrid propulsion systems for aircraft, which promise to reduce fuel consumption and emissions, especially for short-haul flights. The idea of electric propulsion for transportation is not new; indeed, the first cars, nearly 200 years ago, were electric. However, our dependence on fossil fuels over the last 100 years is now being questioned, and as a global society, we are moving toward more-electric transportation solutions.
- 2. **Supersonic Travel Revival**: Companies are developing supersonic passenger jets with advanced aerodynamics and engine technologies, aiming to reintroduce commercial supersonic travel in a more environmentally friendly manner. The Concorde was a supersonic passenger jet jointly developed by British and French aerospace companies, British Aerospace and Aérospatiale, in the 1960s. It made its first commercial flight in 1976 and became an icon of aviation with its sleek design, and ability to travel at speeds of up to Mach 2.04 (2,519km/h) and at altitudes of around 60,000 feet.
- 3. **Reusable Spacecraft**: The advent of reusable rockets and spacecraft, such as SpaceX's Falcon 9 and Dragon, is revolutionizing space exploration and making it more economically viable. A reusable spacecraft is a class of spacecraft that have been designed with repeated launch, orbit, deorbit and atmospheric re-entry in mind. This contrasts with conventional spacecraft which are designed to be expended (thrown away, allowed to burn during re-entry) after use.
- 4. Additive Manufacturing (3D Printing): Additive manufacturing allows for complex and lightweight designs, accelerating prototyping, and reducing manufacturing costs in the aerospace industry. It is the construction of a three-dimensional object from a CAD model or a digital 3D model. It can be done in a variety of processes in which material is deposited, joined or solidified under computer control, with the material being added together, typically layer by layer.
- 5. **Hypersonic Flight and Spaceplanes**: Engineers are developing hypersonic vehicles and spaceplanes capable of delivering payloads and passengers to space and completing intercontinental flights in record time. Hypersonic vehicles are much slower than ballistic (i.e. sub-orbital or fractional orbital) missiles, because they travel in the atmosphere, and ballistic missiles travel in the vacuum above the atmosphere. However, they can use the atmosphere to manoeuvre, making them capable of large-angle deviations from a ballistic trajectory.

6. Aerodynamics and Wing Design: Advancements in computational methods and wind tunnel testing enable engineers to optimize aerodynamics and wing designs, leading to more efficient and high-performance aircraft. Airplanes' wings are curved on top and flatter on the bottom. That shape makes air flow over the top faster than under the bottom. As a result, less air pressure is on top of the wing. This lower pressure makes the wing, and the airplane it's attached to, move up.



7. **Satellite Constellations**: Innovative satellite constellations, such as Starlink, aim to provide global internet coverage, improving connectivity and communication around the world.

Written by: Anuraag Gilhotra (2102424), Sem IV