



Jain College of Engineering & Research Belagavi

(Approved by AICTE, New Delhi, Affiliated to VTU Belagavi & Recognized by Govt. of
Karnataka)



Department of Mechanical Engineering

A Technical Magazine

“MechSpectra-2K23”

Second Edition
2022-2023



683/2A, Udyambag, Angol, Belagavi, Karnataka 590008

About college

At Jain College of Engineering and Research, Belagavi, we ensure that our students rise beyond the average and set remarkable standards through novel thinking and creative abilities which are imbibed in them during their learning years at our institution. We follow a unique blend of academic yet industry friendly curriculum and innovative yet value driven culture building a strong foundation for our leaders of tomorrow.

Vision and Mission of Institute

Vision

To become a leading institute that offers quality technical education and research, nurturing professionally competent graduates with strong ethical values.

Mission

1. Achieve academic excellence through innovative and effective teaching-learning practices.
2. Establish industry and academia collaborations to cultivate a culture of research
3. Ensure professional and ethical values to address societal needs



About Mechanical Engineering Department

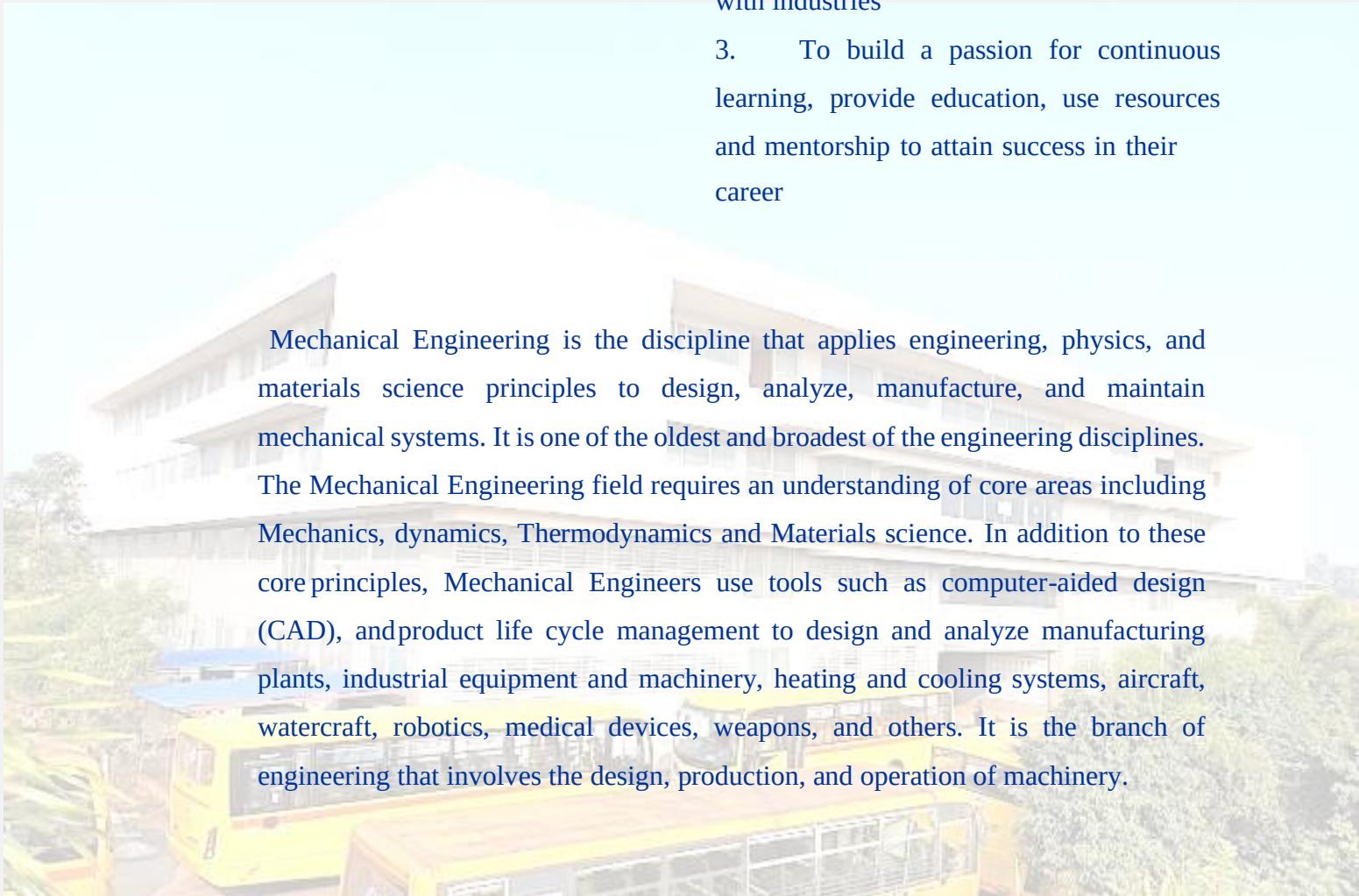
Vision

To develop mechanical engineering graduates with fundamental concepts, practical skills, ethical values and research capabilities to serve industry and society

Mission

1. To cultivate multidisciplinary problem-solving skills, build confidence and contribute to societal improvement
2. To promote research abilities within students by providing academic knowledge, fostering ethical values, and collaborating with industries
3. To build a passion for continuous learning, provide education, use resources and mentorship to attain success in their career

Mechanical Engineering is the discipline that applies engineering, physics, and materials science principles to design, analyze, manufacture, and maintain mechanical systems. It is one of the oldest and broadest of the engineering disciplines. The Mechanical Engineering field requires an understanding of core areas including Mechanics, dynamics, Thermodynamics and Materials science. In addition to these core principles, Mechanical Engineers use tools such as computer-aided design (CAD), and product life cycle management to design and analyze manufacturing plants, industrial equipment and machinery, heating and cooling systems, aircraft, watercraft, robotics, medical devices, weapons, and others. It is the branch of engineering that involves the design, production, and operation of machinery.



Principal Message



Dear Esteemed Readers,

It gives me great pleasure and pride to welcome you to the Second edition of the Mechanical Department Technical Magazine “**MechSpectra**”. I thank all Professors and students for their hard and smart work. Special thanks to the Editorial Board members for their tireless effort. I implore God’s blessing on everyone.

In this fast-paced world of ever-evolving technologies, the field of Mechanical Engineering stands at the forefront of progress. Our collective efforts have pushed the boundaries of what was once thought impossible, shaping the world we live in and paving the way for a brighter and more sustainable future.

Within these pages, you will discover an exceptional blend of cutting-edge Research and inspiring success stories. We aim to provide a diverse and comprehensive view of the dynamic world of Mechanical Engineering, encompassing topics ranging from robotics to precision manufacturing and autonomous vehicles.

Our commitment to Nurturing and Empowering the next generation of Mechanical Engineers remains unwavering. By fostering an environment of creativity, collaboration, and continuous learning, we enable our students to embrace challenges with confidence and forge new paths in their careers.

Furthermore, I extend my appreciation to the industry professionals who have generously shared their expertise which plays a pivotal role in bridging the gap between academia and industry.

Thank you for being an integral part of this incredible journey. May our collective efforts continue to shape a world that is driven by innovation and enriched by the wonders of Mechanical Engineering.

Wishing you a rewarding and insightful reading experience.

With Warm Regards,

Dr.S.V.Gorabal

Principal,

Jain College of Engineering and Research

"Education is the manifestation of the perfection already in man." -Swami Vivekananda

HOD and Dean academic's message



I feel Immense pleasure to present you the Department Technical Magazine “MechSpectra” for the year 2022- 2023 Second edition . The Technical Magazine highlights the achievements and activities of the department in different spheres. By the vision and mission of the department, the faculty and the students are doing their best contributions to reach the goals. It is certainly not an easy task to set high standards and then excel at these standards year after year. The college has been a forerunner in adopting technologies and efforts which have won acclaim in academic circles. I am fully confident that the department will march ahead and add more achievements to its name. I would like to send my best wishes to the staff and students for showing commendable performance and giving a good account of themselves in worthwhile endeavors.

With Warm Regards,

Dr. Nandeesh M

HOD and Dean academic's

“An investment in knowledge pays the best interest”. – Benjamin Franklin



Industrialist Message

I'm excited to extend my warmest congratulations on the launch of the Second edition of Technical Magazine "MechSpectra". It's fantastic to witness an avenue for Mechanical Engineering enthusiasts to connect, learn, and grow together.

Mechanical Engineering is the backbone of innovation, creating the machines, systems, and tools that shape our modern world. This magazine is a valuable platform to showcase the incredible work being done by Students of JCER, who are driving progress in this field.

As an industrialist who values the power of knowledge sharing and collaboration, I'm truly excited about the opportunities that technical magazine "MechSpectra" will offer. The exchange of ideas, experiences, and insights within these pages will undoubtedly spark innovations and encourage aspiring engineers to contribute their unique perspectives.

I'm looking forward to seeing "MechSpectra" evolve and flourish, becoming a source of inspiration and guidance for Mechanical Engineers at all stages of their careers. Together, we can propel the Mechanical Engineering community to greater heights and make a lasting impact on the world.

Best regards,

Mr. Gururaj Katti

Proprietor

CNC Machining

Solutions No. 685/A4

Udyambag Belagavi,

Karnataka

"The best way to predict your future is to create it." —Abraham Lincoln

Editor message



Dear Readers,

It is with great pride and excitement that we present to you the Second edition of our esteemed Mechanical Engineering Technical Magazine “MechSpectra”. As we embark on this exhilarating journey, we envision a platform that will foster knowledge-sharing, innovation, and collaboration within the Mechanical Engineering community.

This inaugural issue is a testament to the relentless pursuit of excellence in the field of Mechanical Engineering. With a diverse array of articles, Research papers, we aim to captivate your curiosity and expand your understanding of the boundless possibilities within this domain.

We are immensely grateful to our dedicated team of Editorial board members, and Industry experts who have passionately contributed their expertise and insights to curate this enriching compilation. Each article is crafted to encapsulate cutting-edge advancements, address critical challenges, and spotlight the achievements of visionaries shaping the future of mechanical engineering.

Thank you for being a part of this momentous occasion. We look forward to your feedback and support as we strive to make our magazine a definitive resource for the Mechanical Engineering fraternity.

Regards,
Prof. Karthik N Ramadurg
Editor-in-Chief,
Magazine

“The roots of Education are bitter, but the fruit is sweet”. – Aristotle

CO Editors



*Prof. Rahul R
Bubanale*



*Prof. Shubham
Chougule*



Prof. Praveen K Patil



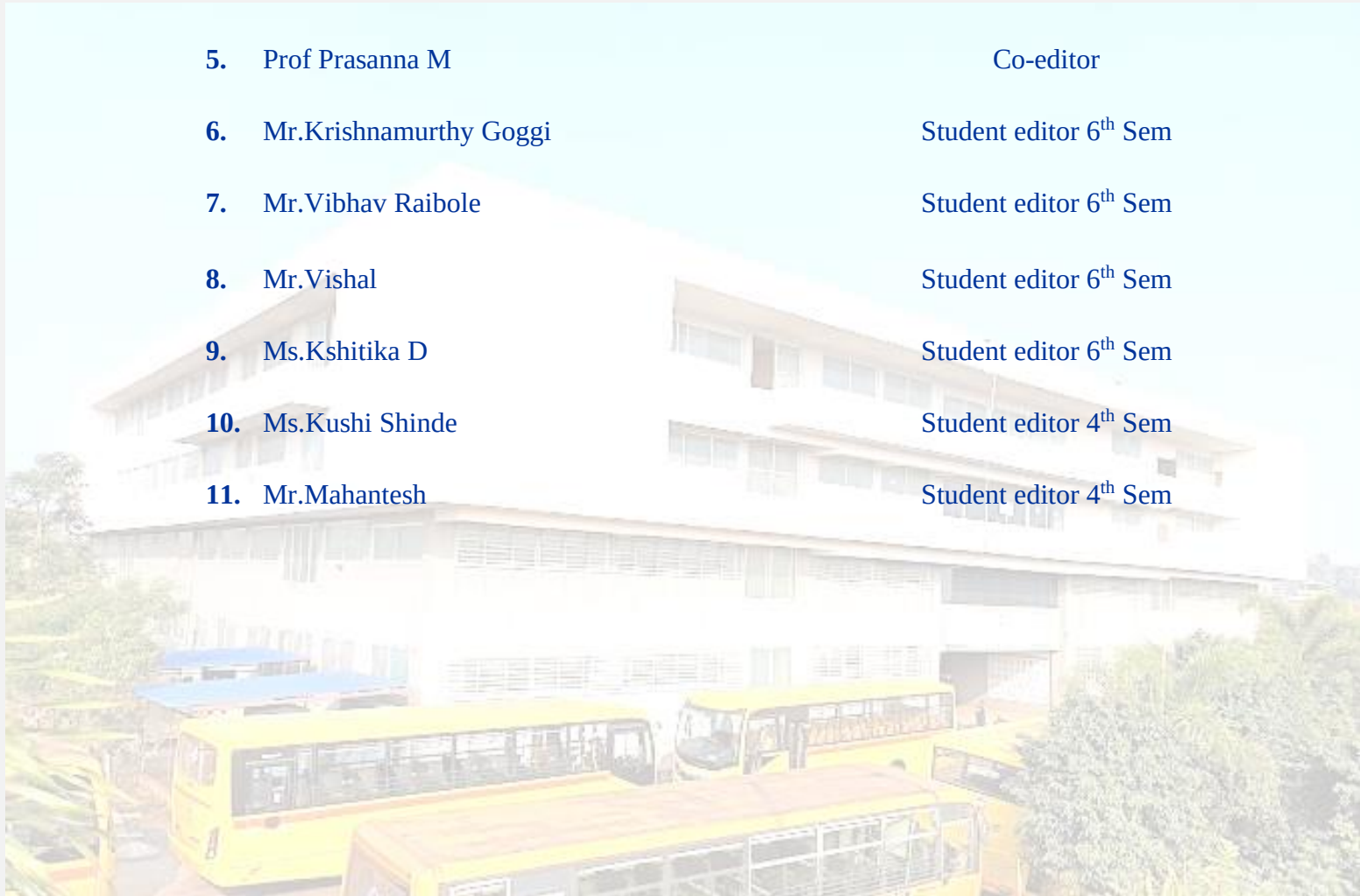
Prof. Prasanna M



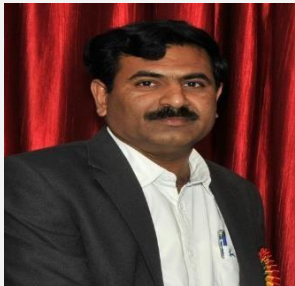
MechSpectra Editing Team

Sl no Name

- | | | |
|-----|------------------------|------------------------------------|
| 1. | Prof.Karthik Ramadurg | Chief editor |
| 2. | Prof. Shubham Chougule | Co-editor |
| 3. | Prof.Rahul Bubanale | Co-editor |
| 4. | Prof.Praveen Patil | Co-editor |
| 5. | Prof Prasanna M | Co-editor |
| 6. | Mr.Krishnamurthy Goggi | Student editor 6 th Sem |
| 7. | Mr.Vibhav Raibole | Student editor 6 th Sem |
| 8. | Mr.Vishal | Student editor 6 th Sem |
| 9. | Ms.Kshitika D | Student editor 6 th Sem |
| 10. | Ms.Kushi Shinde | Student editor 4 th Sem |
| 11. | Mr.Mahantesh | Student editor 4 th Sem |



Teaching Staff details

Slno	Name of the Faculties	Specialization	Year of experience	
1.	Dr. S.V.GorbaL	Production and Management	24	
2.	Dr. Nandeesh Mathad	Thermal Engineering	23	
3.	Prof.PrasannaM	Machine Design	4	
4.	Prof. Shubham C	Design Engineering	7	

5.	Prof.Praveen Patil	Thermal Power Engineering	7	
6.	Prof. Karthik Ramadurg	Thermal Power Engineering	8	
7.	Prof. Rahul R Bubnale	Tool Engineering	9	
8.	Dr. Gangadhar K	Production	7	
9.	Prof.Rayappa Mahale	Production	8	

Technical staffs

Sl no	Name	Experience	Qualification	
1.	Mr. Mallappa Khatawe	34	Diploma in Mechanical Engineering	
2.	Mr. Jotiba Badiger	30	Diploma in Mechanical Engineering	



MOUs Signed by Department of Mechanical Engineering

To have a better interaction between Academic institutes and industries is today's need. For students, it is necessary to have industry knowledge/exposure with strong academics. On the other hand, industries are also in need of students with sound academics and some industrial touch. So the aim of signing an MOU with various industries is to encourage the interaction between the academic and Industrial fields. It helps to bridge the gap between the industry, the real world and the institute. For faculty also, industrial exposure is very much helpful to guide students about the latest industrial practices.

Objectives

- To enhance students' skills and knowledge.
- To give an insight into the latest developments/requirements of the industries.
- To promote industrial training / visits.
- To help the delivery of the Internship.
- To help the students for their placement.
- To arrange guest lectures on technology trends.
- To collaborate with faculty in research & consultancy work

Sl no	MOU Signed
1.	Abhishek Alloys, Pvt. Ltd. Plot No. 58 Machhe Industrial Estate, Belgaum, Karnataka.
2.	Jina Special Steel Works Pvt. Ltd. K.I.A.D.B, Industrial area, Honga, Belagavi, Karnataka
3.	Cadmaxx Edtech Pvt Ltd #2095, 1st Floor, 5th Main, 9th Cross, RPC Layout, Vijayanagara, Bangalore – 560104
4.	Omneity Group, Udyambag, Belgaum, Karnataka
5.	Edureka Learning Center, Belagavi

University Position and Placement

S. No.	Name of the student placed	Name of the Employer
1	Apurva Kowadkar	Belgaum Aqua Valves Pvt. Ltd.
2	Gourav Kademani	Belgaum Aqua Valves Pvt. Ltd.
3	Mahek Soudagar	Belgaum Aqua Valves Pvt. Ltd.
4	Mainuddin Jamadar	Imosys Engineering Company Pvt. Ltd.
5	Namrata Hiremath	Faurecia Forvia, Bengaluru
6	Pramod Ghatage	M/S Pyrotech Engineers
7	Rohit D. Avane	Belgaum Aqua Valves Pvt. Ltd.
8	Shubham Belvatkar	Cognizant, Bengaluru
9	Sumit Navgekar	Belgaum Aqua Valves Pvt. Ltd.
10	Tejan Shinde	SFS group, Belagavi
11	Varshini Rudraswamimath	Belgaum Aqua Valves Pvt. Ltd.
12	Yash Badodekar	SFS group, Belagavi
13	Vaishanavi Kulkarni	Ashok Iron Works Pvt. Ltd., Belagavi
14	Kushal Walagad	Belgaum Aqua Valves Pvt. Ltd.
15	Sourabh Pawar	Belgaum Aqua Valves Pvt. Ltd.
16	Nikhil Karikatti	Triotek Solutions Pvt. Ltd. Bengaluru

Students Admitted to Higher Studies		
S. No.	Name of the student	Name of the University
1	Lingaraj Ladi	California State University Northridge USA
2	Vrushank P	California State University Northridge USA
3	Yogesh Hiremath	Office of Graduate Studies University of Michigan- Dearborn
4	Anjali Vardai	KLS, Gogte Institute of Technology

Students with University Rankings

The Department of Mechanical Engineering provides a unique teaching and learning environment to students through efficient and experienced staff members. The students are motivated to engage in co-curricular activities and hobby projects. A proud student of Jain College of Engineering and Research Mr. Nikhil Jadhav from the Mechanical Department, 2018-2022 batch has secured 6th rank in the Final VTU examination and Mr. Mahesh Ghasti from the 4th semester Has secured 5th place in the 3rd semester

Sl no	Name	Semester/Year	University position	Photo
1	Nikhil Darasharth Jadhav	2018-2022	6 th	
2	Mahesh Ghasti	3 Semester	5 th	

Technical Events

Faculty Development Programme

FDP on “Research Methodology and Effective Teaching

Skills” Date : 15-20th May 2023

The main objective of the Faculty Development Programme (FDP) is to up-gradation of knowledge and teaching skills, and identify the Research areas and opportunities for teacheremployed in various disciplines of Engineering & Technology, polytechnics, MBA etc. The program also covers areas such as technical education policies, new Education policies, opportunities abroad, Teaching methods and techniques, skills development, motivation, communication skills, management concepts and other relevant issues to keep pace with the changing scenario in Technical Education. The program is designed to enhance the teaching and other skills of the faculty and to make them aware of the recent developments in engineering and technology. It will not only promote the professional practices relevant to technical education but also motivates the faculty to achieve a competitive teaching and learning environment, thus channelizing development concerning academic qualifications and personal matter.

The speakers from various universities have delivered sessions in FDP

Resources persons delivered Lectures in FDP

Dr. Arun Patil, Associate Professor, KLE Technological University, Hubballi

Dr. P S Shivakumar Gouda, Associate Professor, SDMCET, Dharwad

Dr. Keshavamurthy, Professor and Head, Department of Mechanical Engineering, Dayanand Sagar COE, Bengaluru

Dr. Manjappa Sarathi, Director Research, Sahyadri College of Engineering and Management, Mangaluru

Dr. Piyush Kumar, Professor, Nitte Meenakshi Institute of Technology, Bengaluru

Dr. Rajkumar V Raikar, Professor, KLE Dr. MSSCOET, Belagavi

Dr. Vijay Tambrallimath, Assistant Professor, Manipal Institute of Technology, Manipal

Dr. R. S. Upendra, Associate Professor, REVA University, Bengaluru

Dr. Madhav Murthy, Assistant Professor, PLN Welingkar Institute of Management and Research, Bengaluru

Dr. S V Gorabal, Principal, JCER, Belagavi

Shri. Mokshatmanandaji Maharaj, Shri Ramakrishna Aashram, Belagavi

Dr. Arun M. Isloor, Professor, NITK, Surathkal





2. Department of Mechanical Engineering in association with CADMXX EDTECH, Bengaluru Organizes a webinar on **“Getting Industry Ready”** on 25th August 2022 And key speakers for the sessions were Shri Kashinath M Pattenshetty from ACE Designers Bengaluru and shri Vijaya Mahantesh from Embeded systems Bengaluru.

3. Department of Mechanical Engineering in association with Kohort organizes a Technical talk on **“Study Abroad Opportunities- Scholarships, Free and Top universities admission”** on 24th November 2022 and the key speakers for the sessions were Mr. PavanShriram , Founder of KOHORT , Digital Norway.



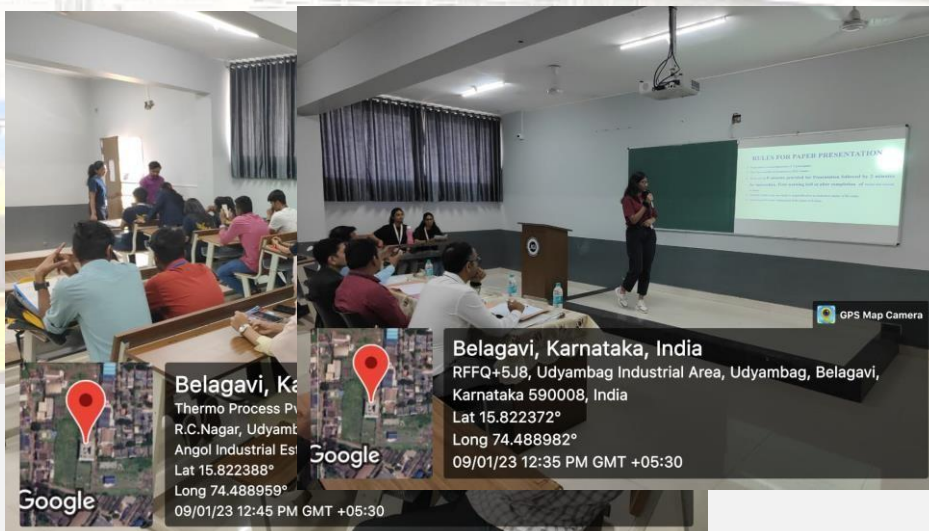
*Technical events of Mechanical Engineering
Department*



Technical Paper Presentation

Technical Presentation skills help to create innovative ideas when students come up with creative and interesting slides to illustrate their talk. The use of presentation aids makes for a much more interesting talk, and the creation of such aids can help to develop students' confidence.

From the Mechanical Engineering department. The technical paper presentation was organized for the inter and intra college students on 09th June 2023 during the Technical fest “SAVISHKAR-2K23”

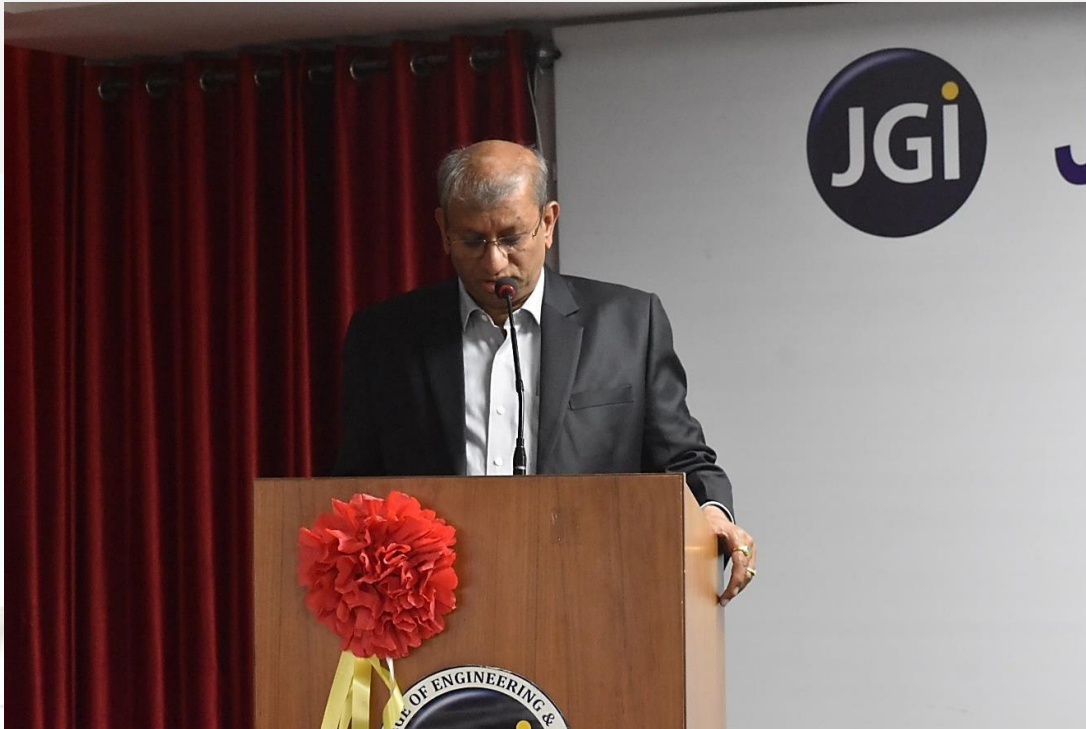




Technical Paper Presentation Team



Interactive Session on “National Education Policy” by Dr. Vidyashankar Vice Chancellor VTU, Belagavi



Interactive Session on “Importance of Innovation and Research ” by Dr. B. E. Rangaswamy Registrar VTU, Belagavi


Signature & Seal
(IIC President or Head of the Institution)
Name: Dr. S V Gorabal
Place: Belagavi
Principal
Jain College of Engineering
& Research, Belagavi



Industrial visit organized for students

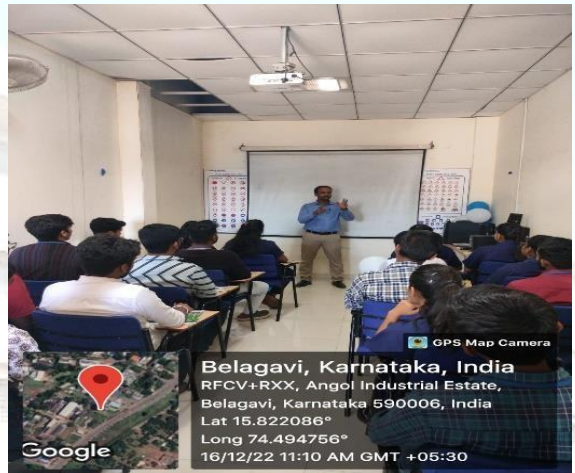
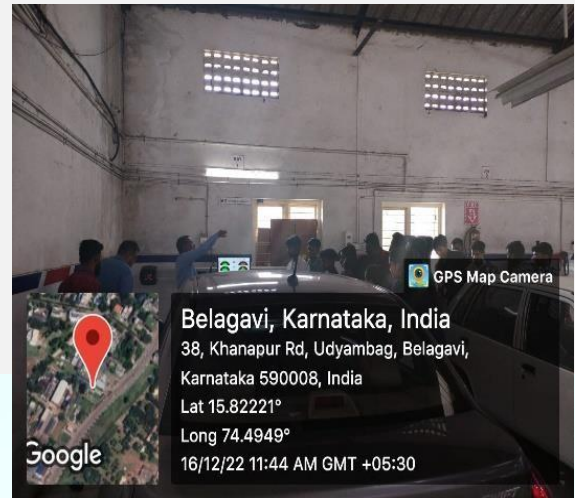
The Industrial visits provide students an insight into the real working environment, workstations, plants, assembly lines, machines, and systems, and interact with highly trained and experienced personnel. The department has organized industrial visits for Mechanical Engineering students.

The students of 3rd year are taken to industrial visit at Abhishek Alloys Pvt.Ltd on 27th April to 28th April 2022.



Industrial visit at Abhishek Alloys Pvt.Ltd

The students of 2nd year are taken to industrial visit at Maruti Suzuki workstation on 16th December 2022.



industrial visit at Maruti Suzuki Workstation

Industrial projects

Industrial projects are of great significance for students of mechanical engineering as they provide practical exposure and hands-on experience in real-world engineering scenarios. Here are some of the industrial projects carried out by the students of Mechanical Engineering.



Overall, industrial projects offer a practical, enriching experience that complements the theoretical knowledge gained in the classroom, preparing mechanical engineering students to excel in their future careers.

Project Exhibition

Department of Mechanical Engineering organized a final year students inhouse project exhibition and demonstration on 3rd July 2022-2023 in JCER campus.



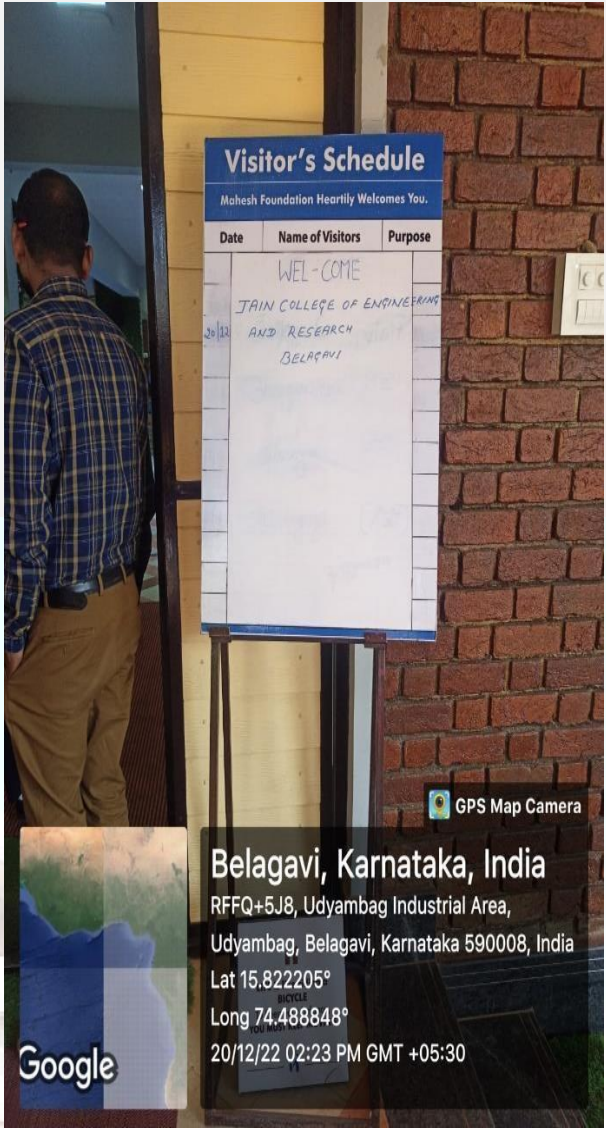
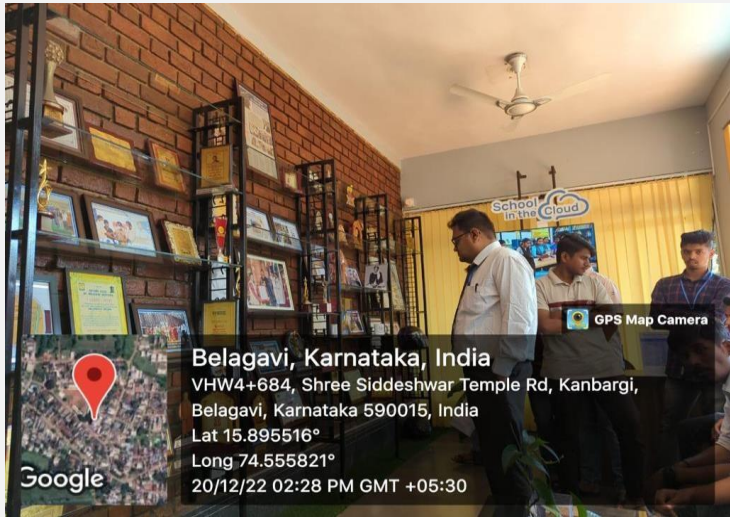
List of funded projects			
Si · N o.	Name of the Students	Project Title	Funded by
Academic Year (2022-23)			
1	Mr. Kushal Walagad	360 Degree Turning Electric Forklift For Industry Warehouses And Domestic Purposes	KSCST, Bengaluru
2	Mr. Sudeep Kolekar		
3	Mr. Sushil Hindalgekar		
4	Mr. Somaraj Bhekane		
1	Mr. Subhash Pawale	Design And Fabrication Of Hydraulic Machine For Selective Plant Plucking And Cutting	KSCST, Bengaluru
2	Mr. Sumit Navgekar		
3	Mr. Kartik Shanbag		
1	Namarata Hiremath	5S and Kaizen Implementation for Process Improvement in The Casting Industry	Belgaum Foundry Cluster
2	Vaishnavi Kulkarni		
1	Abhishek Jadhav	Remedial Measures for Casting Defects Using The Taguchi Orthogonal Array Approach	Belgaum Foundry Cluster
2	Sandeep Jadhav		
3	Sourabh Pawar		

YRS/NSS/Social Awareness and Responsibility

Social Awareness and Responsibility involve the awareness, understanding, and appreciation of connections among people, including between people and the natural environment. Social Awareness and Responsibility focuses on interacting with others and the natural world in respectful and caring ways. People who are socially aware and responsible contribute to the well-being of their social and physical environments. They support the development of welcoming and inclusive communities, where people feel safe and have a sense of belonging. A socially aware and responsible individual contributes positively to their family, community, and environment; empathizes with others and appreciates their perspectives; resolves problems peacefully; and develops and sustains healthy relationships. The following social activities are conducted by the department of Mechanical Engineering

1. Campus cleaning program
2. Adoption Tress
3. Distribution of mask to Government school children's
4. Awareness of Clean campus to Government schools
5. Visit of NGO (Mahesh Foundation Belagavi)







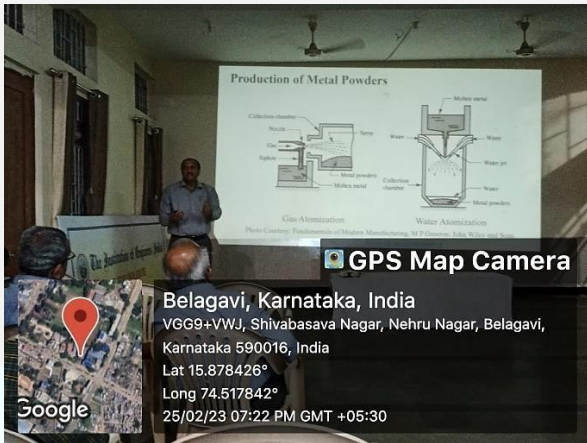


Faculty corner

Here are the Achievements of Mechanical Engineering Department faculties of JCER

Sl no	Name of the staff	No of seminars	No of conferences	No of papers	No of workshop	No. of FDP/Others
1.	Dr. S. V. Gorbhal		3	5	5	1
2.	Dr. Nandesh Mathad		0	1	0	1
3.	Dr. Gangadhar M Kanaginahal	1	0	5	2	1
4.	Prof. Rayappa Mahale	1	1	12	1	3
5.	Prof. Karthik Ramadurg	1	1	2	4	6
6.	Prof. Rahul Bubnale	2	0	1	2	2
7.	Prof. Rajshekar P Biradar	0	0	0	0	1
8.	Prof. Praveen K Patil	1	1	2	2	1
9.	Prof. Shubham A Chougule	3	1	2	1	2
10.	Prof. Prasanna Mangaokar	0	0	0	1	1

- Prof. Rayappa Shrinivas Mahale has delivered a technical talk on “Advancement in Powder Metallurgy and Particulate Materials” at Institution of Engineers India, Belagavi local chapter, on 25th February 2023



Articles by faculties

Are Electric vehicles fulfil our future needs ?



Article by:

Dr. Nandeesh

M. Associate

Professor, Dean &

HOD

Department of Mechanical
Engineering, Jain College of
Engineering & Research, Belagavi.



Future EV from TATA motors





Electric vehicles (EVs) are gaining more popularity over the past few years as the technology developed. The costs have declined and support for clean transportation has promoted awareness, increased charging opportunities, and facilitated EV adoption. To date, global automakers are pledging more than \$140 billion to transportation and electrification. More than 50 light-duty EV models are available commercially in the U.S. market (Moore and Bullard 2020). Approximately 130 EV models are anticipated by 2023. Future projections of the role of EVs in LDV (Light duty vehicles) markets vary widely with estimates ranging from limited success (~13% of sales in 2050) to full market dominance, with EVs accounting for 100% of light-duty vehicle sales well before 2050. Many studies project that EVs will become economically competitive with ICEVs (internal-combustion-engine vehicles) shortly or that they are already cost-competitive for some applications. Therefore, EV success is entangled closely with the prospect of abundant and affordable renewable electricity (in particular solar and wind electricity) that is poised to transform power systems. Vehicle electrification is a game-changer for the transportation sector due to major energy and environmental implications driven by high vehicle efficiency (EVs are approximately 3 to 4 times more efficient than ICEVs, zero tailpipe emissions, and reduced petroleum dependency (great fuel diversity and flexibility exist in electricity production)). The following factors need to be addressed for suitable adaptability

EV adoption:

The global rate of adoption of light-duty electric vehicles (passenger cars) has increased rapidly since the mid-2010s, supported by three key pillars: improvements in battery technologies; a wide range of supportive policies to reduce emissions; and regulations and standards to promote energy efficiency and reduce petroleum consumption. EV adoption is projected to remain limited until 2030, and high uncertainty is shown afterward with widely different projections from different sources. However, EVs hold great promise to replace conventional LDVs affordably.

Problems in EV

To date include consumer scepticism toward new technology, high purchase prices, limited range and lack of charging infrastructure and lack of available models and other supply constraints. A major challenge facing both manufacturers and end-users of medium- and heavy-duty electric vehicles is the diverse set of operational requirements and duty cycles that the vehicles encounter in real-world operation. EVs appear to be well-suited for short-haul trucking applications such as regional and local deliveries. The potential for battery-electric models to work well in long-haul on-road applications has yet to be established, with

different studies indicating different opportunities.

Need for Battery technologies:

Batteries are playing a key role in the operation of EVs, and power electronics and electric motors are also key components of an EV power train. Further price reduction in batteries is needed to achieve EV purchase-price equality with ICEVs. Over the last 10 years, the specific energy of a lithium-ion battery cell has almost doubled reducing battery weight significantly. Recent trends toward integration promise to deliver benefits in terms of increased power density, lower losses, and lower costs.

Charging stations:



With a few million EVs (LDV) on the road, currently, there is about one public charge point per 10 EVs in the U.S. (though most vehicles have access to a residential charger). Given the importance of home charging (and the added convenience compared to traditional refueling at public stations), charging solutions in residential areas comprising attached or multiunit accommodations is likely to be essential for EVs to be adopted at large scale. Although public charging arrangement is clearly key point to EV purchasers, how best to deploy charging infrastructure in terms of numbers, types, locations, and timing remains an active area for research. The electrification of medium- and heavy-duty commercial trucks and buses might introduce unique charging and infrastructure requirements compared to those of light-duty passenger vehicles. Wireless charging, specifically high-power wireless charging, could play a key role in providing an automated charging solution for tomorrow's autonomous vehicles.

Power system integration

Accommodating EV charging at the bulk power-system level (generation and transmission) is different in each region, but there are no major known technical challenges or risks to support a growing EV fleet, especially in the near term (approximately one decade). At the local level, however, EV charging can increase and change electricity loads significantly, causing possible negative impacts on distribution networks, especially for high-power

charging. The integration of EVs into power systems presents opportunities for synergistic improvement of the efficiency and economics of electro mobility and electric power systems, and EVs can support grid planning and operations in several ways.

There are still many challenges for effective EV-grid integration at large scale, linked not only to the technical aspects of vehicle-grid-integration (VGI) technology but also to societal, economic, business model, security, and regulatory aspects. VGI offers many opportunities that justify the efforts required to overcome these challenges. In addition to its services to the power system, VGI offers interesting perspectives for the full exploitation of synergies between EVs and VRE (Variable renewable energy) as both technologies promise large-scale deployment in the future.

Life-cycle cost and emissions: Many factors contribute to variability in EV life-cycle emissions, mostly the carbon intensity of electricity, charging patterns, vehicle characteristics, and even local climate. Grid de-carbonization is a prerequisite for EVs to provide major GHG (green house gas) emissions reductions. Existing literature suggests that future EVs can offer 70%–90% lower GHG emissions compared to today's ICEVs, most obviously due to broad expectations for continued grid de-carbonization. Operational costs of EVs (fuel and maintenance) are typically lower than those of ICEVs, largely because EVs are more efficient than ICEVs and have fewer moving parts. Several studies project major roles for EVs in the future, which are reflected in massive investment in vehicle development and commercialization, charging infrastructure, and further technology improvement

Conclusion : EVs hold great promise to replace ICEVs affordably for a number of on-road applications, eliminating petroleum dependence, improving local air quality and enabling GHG-emissions reductions, and improving driving experiences. Forecasting the future, including technology adoption remains a daunting task. However, this detailed review paints a positive picture for the future of electric vehicles across a number of on road applications

Magneto-Rheological Fluids



Article by:

Prof. Prasanna Mangaonkar,

Assistant Professor,

Department of Mechanical Engineering,
Jain College of Engineering & Research,
Belagavi.

Magneto-rheological (MR) fluids are materials that respond to an applied magnetic field with a dramatic change in rheological behavior. An MR fluid is in a free-flowing liquid state in the absence of a magnetic field, but under a strong magnetic field its viscosity can be increased by more than two orders of magnitude in a very short time (milliseconds) and it exhibits solid-like characteristics. The strength of an MR fluid can be described by shear yield stress. Moreover, the change in viscosity is continuous and reversible, i.e. after removing the magnetic field the MR fluid can revert to a free-flowing liquid. Using these characteristics of MR fluids, MR fluid devices can provide simple, quiet, rapid response interfaces between electronic controls and mechanical systems.

The research into MR fluids has become an important branch in the field of intelligent materials. Classical MR fluids are non-colloidal suspensions of magnetizable particles, having a size of the order of a few microns, in liquids of low permeability. Devices based on MR fluids include dampers, brakes, clutches, polishing devices, hydraulic valves, seals, composite structures, etc. In 1948, Rabinow (a scientist) invented MR fluid and developed an application device: a clutch.

The main advantages of MR fluids are a yield strength of up to 50–100 kPa, which is one order of magnitude higher than ER fluids, insensitivity to contaminants, using 12–24 V low voltage, relatively broad working temperature range (typically 40 to 150 °C). Since the early 1990s, there has been a resurgence of interest in MR fluids. In recent years, MR fluid devices have been applied commercially to engineering fields, such as automobiles, exercise equipment and polishing machines.

Understanding HVAC Systems: Creating Comfortable Spaces and Improving Energy Efficiency



Article by:

Prof. Karthik N Ramadurg

Assistant Professor,

Department of Mechanical Engineering,

Jain College of Engineering & Research, Belagavi.

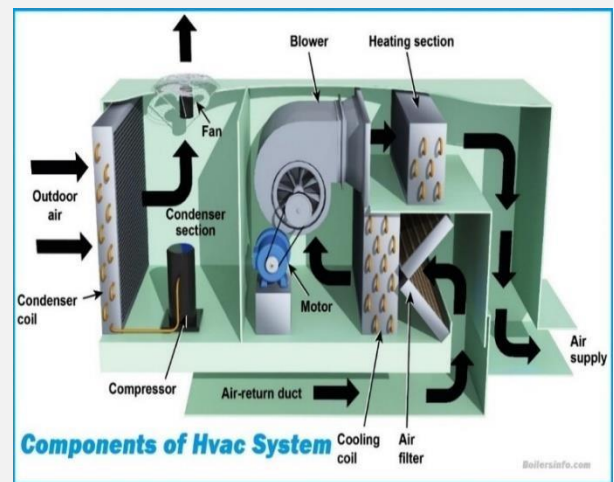
Introduction

The Heating, Ventilation, and Air Conditioning (HVAC) system is an integral component of modern buildings, providing comfort and maintaining a healthy indoor environment for occupants. Whether it's a cozy home, a commercial establishment, or an industrial facility, a well-designed HVAC system plays a crucial role in ensuring optimal temperature, humidity, and air quality. This article explores the fundamentals of HVAC systems, their components, benefits, and the importance of energy efficiency in the quest for sustainable living.



What is HVAC?

HVAC stands for Heating, Ventilation, and Air Conditioning. It is a comprehensive system responsible for regulating indoor environmental conditions. Heating is essential for maintaining warmth during colder months, while air conditioning provides relief from scorching summer temperatures. Ventilation is critical for fresh air circulation and removing pollutants, ensuring a healthy indoor environment.



Components of an HVAC System

a. Heating System: This component can be powered by various sources, including furnaces, boilers, or heat pumps. Furnaces burn fuel (usually natural gas) to generate heat, while boilers heat water to produce steam. Heat pumps, on the other hand, transfer heat from one location to another using refrigerant.

b. Cooling System: Air conditioners or heat pumps are responsible for cooling indoor spaces. They remove heat from the indoor air and transfer it outside, resulting in a comfortable temperature.

c. Ventilation System: This component ensures a continuous flow of fresh air, preventing the buildup of stale air and pollutants. Proper ventilation is crucial for maintaining indoor air quality and preventing the spread of airborne diseases.

Benefits of a Well-Designed HVAC System

a. Comfort: A properly functioning HVAC system ensures a comfortable indoor environment year-round, regardless of the external weather conditions.

b. Improved Air Quality: Effective ventilation helps remove allergens, pollutants, and odors, promoting a healthier indoor atmosphere.

c. Energy Efficiency: Investing in energy-efficient HVAC systems reduces electricity consumption and lowers utility bills, contributing to a more sustainable lifestyle.

d. Increased Productivity: In commercial settings, a well-maintained HVAC system can improve employee productivity by providing a comfortable workspace.

e. Equipment Longevity: Regular maintenance and timely upgrades extend the lifespan of HVAC equipment, reducing the need for frequent replacements.

The Importance of Energy Efficiency

With rising concerns about climate change and environmental sustainability,

energy efficiency has become a top priority. HVAC systems are one of the largest energy consumers in buildings, accounting for a significant portion of total energy usage. To address this, advancements in technology have led to the development of energy-efficient HVAC systems with features like variable-speed compressors, smart thermostats, and zoning controls.

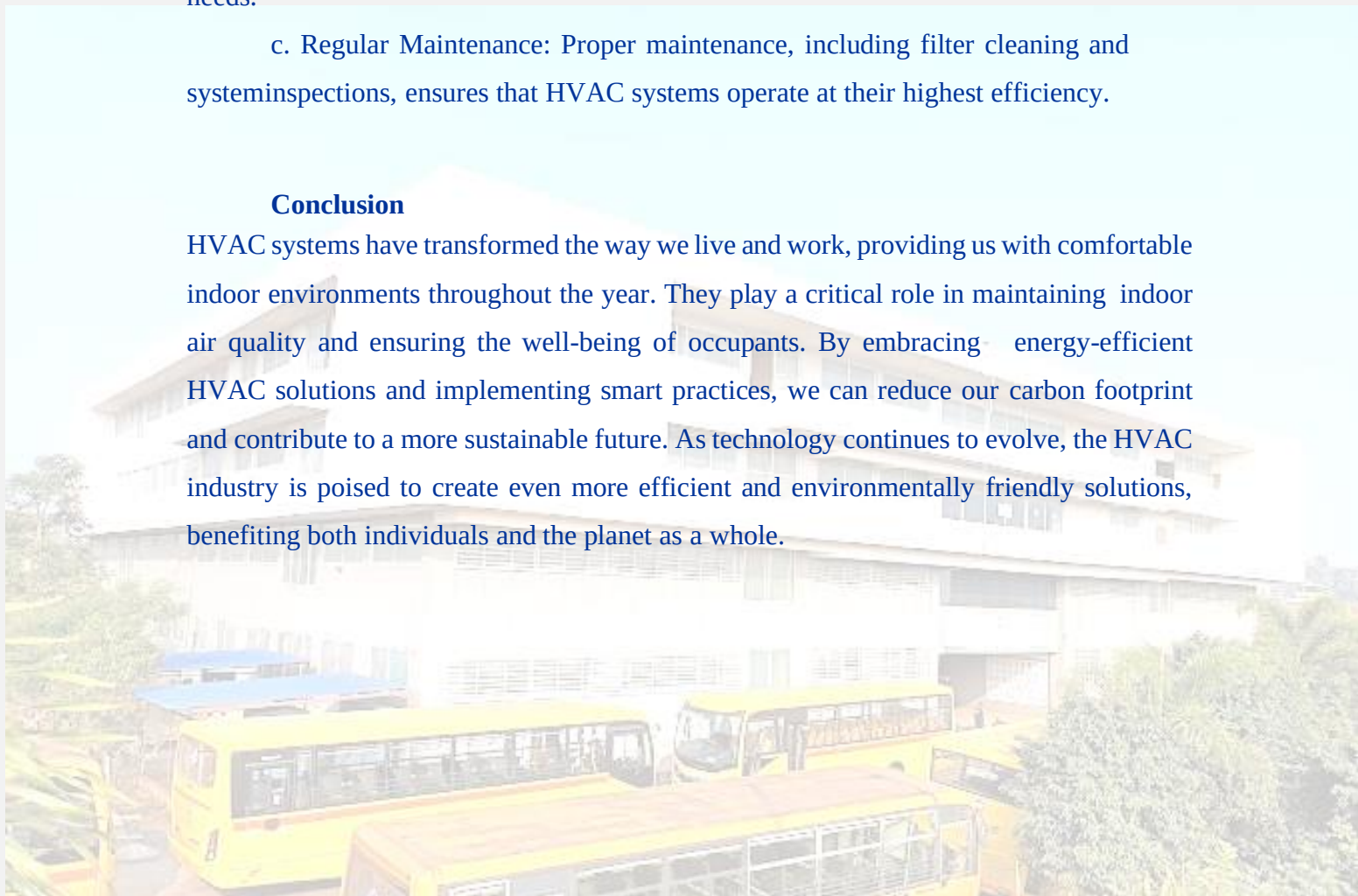
a. Smart Thermostats: These devices optimize temperature settings based on occupancy patterns, saving energy when spaces are unoccupied.

b. Zoning Controls: Zoned HVAC systems allow different areas of a building to be independently controlled, optimizing comfort and energy usage based on specific needs.

c. Regular Maintenance: Proper maintenance, including filter cleaning and system inspections, ensures that HVAC systems operate at their highest efficiency.

Conclusion

HVAC systems have transformed the way we live and work, providing us with comfortable indoor environments throughout the year. They play a critical role in maintaining indoor air quality and ensuring the well-being of occupants. By embracing energy-efficient HVAC solutions and implementing smart practices, we can reduce our carbon footprint and contribute to a more sustainable future. As technology continues to evolve, the HVAC industry is poised to create even more efficient and environmentally friendly solutions, benefiting both individuals and the planet as a whole.



StudentsNCorner

Student's Achievements

- Mr. Vishal H Rudragoudar has completed the Google UX design course through Coursera.
- Ms. Kshitika Doddannavar from Mechanical Department Secured First place in Samveekhana-2K23 a National level Technical Paper Presentation, held on 26th & 27th May 2023 at SGBIT Belagavi.
- Mr. Vaibhav Raibole and Krishnamurthy Goggi 6th Semester from Mechanical Department presented a paper "Impact of sintering on the metal-organic framework a review" Powder Metallurgy Association of India. From 13th to 15th March 2023 held at Hotel The Lalit, Mumbai.
- Mr. Vaibhav Raibole and Krishnamurthy Goggi 6th Semester from Mechanical Department attended PMAI Conference and shared their ideas with SACMI industries from the Italy group on 15th March 2023 held at Hotel The Lalit, Mumbai.
- Mr. Akash Mirashi, Nikhil D Jadhav, Prithvi A Shreyakar, and Suhan S Nayak of the 8th sem 2022 batch presented a paper on "Design and Analysis of Horizontal Crystallizer for Agro chemical Industries" on 09 & 10th Feb 2023, held at KPR Institute of Engineering And Technology Coimbatore, Tamil Nadu
- Natasha Fernandes participated in the Inter-College Table Tennis Competition, which was held at KLS Gogte Institute of Technology Udaymbag, Belagavi in 2022.
- Mr. Vishal H Rudragoudar participated in DEVFEST 2022 organized by google developers group Belagavi on 10th December 2022
- Mr. Yash Ajay Badodekar from 8th-semester photography is published in the international level magazine "Discover Wildlife" (BBC Wildlife) on 27/08/2022.
- Mr. Yash Ajay Badodekar from 8th-semester photography is published in the international level magazine "Wild Planet Magazine" on 27/05/2022.
- Mr. Yash Ajay Badodekar from 8th semester photography is published in international level magazine "**Discover wild life**" (BBC Wild life) on 25/05/202

Bearings



Article by:

Mr. Hrishikesh Patil
4th sem

A bearing is a machine element that enables machinery to move with less friction and more precision. It can bear the load of the moving parts and reduce noise and vibration. A bearing consists of smooth metal balls or rollers and a smooth inner and outer surface for them to roll against.



Function of Bearing



To decrease friction: On this basis, the bearing can be defined as that part that keeps the shaft moving smoothly and consistently while decreasing friction.

- For this usage, bearings are used in several industrial applications, automotive as well as fleet.
- This is one of the most prominent functions of the bearings.

For supporting a load: The bearing contains the property through which it can effectively decrease the energy and effort needed to move or slide an object over the surface. This functionality of bearing is among the common ones yet of great importance.

For supporting a load: The bearings are the effective materials present in the shaft in which the shaft readily pushes the bearing in the same direction in which there is a moving load.

- The core factors on which the loads rely are dependent upon both direction and weight.
- In this case, if we will use the wrong kind of bearing, then we may not carry the needed load.

Materials

The first plain and rolling-element bearings were wood, closely followed by bronze. Over their history, bearings have been made of many materials, including ceramic, sapphire, glass, steel, bronze and other metals. More recently, plastic bearings made of nylon, polyoxymethylene, polytetrafluoroethylene, and UHMWPE, among other materials are being used today.

Design

Parts of bearing

- **The outer ring or outer race**

This is the bearing's exterior ring, and the core functionality of this component is to protect the internal parts of the bearing. For this, it has to be machined with accurate and smooth touch.

- **Inner race**

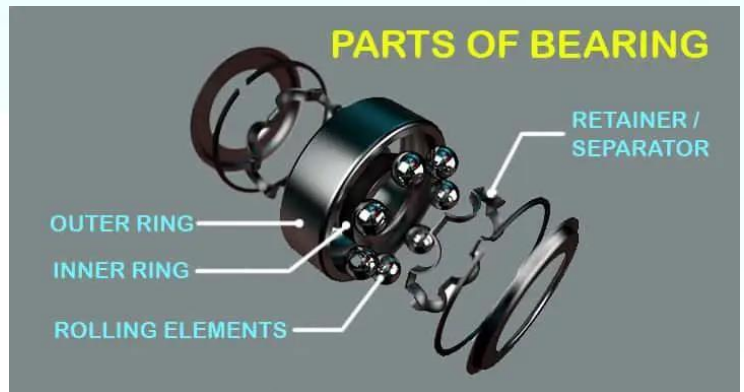
The inner race is the component of the bearing that effectively sits directly on the shaft.

- **Outer race**

This is the outer ring of the bearing that contains the rolling balls. These balls help the bearing to move smoothly. The practical shape of the rolling elements critically depends upon the load that is going to lie on the bearing. It also depends on the multiple applications.

- **Separator**

The separator is a metal retainer that effectively holds the rollers and balls. The separator is positioned in between the outer, and inner races. The core function of the separator keeps the rolling elements in an even-spaced setting.



Motion

Common motions permitted by bearings are:

- Radial rotation e.g. shaft rotation;
- Linear motion e.g. drawer;
- Spherical rotation e.g. ball and socket joint;
- Hinge motion e.g. door, elbow, knee.

Service life

The service life of the bearing is affected by many factors not controlled by the bearing manufacturers. For example, bearing mounting, temperature, exposure to external environment, lubricant cleanliness, and electrical currents through bearings.

Rolling element bearing life is determined by load, temperature, maintenance, lubrication, material defects, contamination, handling, installation and other factors. These factors can all have a significant effect on bearing life. For example, the service life of bearings in one application was extended dramatically by changing how the bearings were stored before installation and use, as vibrations during storage caused lubricant failure even when the only load on the bearing was its own weight

Manufacturers

- Timken
- SKF
- Schaeffler Group
- NSK
- NTN
- Koyo Seiko
- MinebeaMitsumi



AUTOMATION



Article by:

Mr. Sameer Khan
4th sem



INTRUCTION:

Automation is the process of using technology and machinery to perform tasks without direct human intervention. It has been a transformative force in various industries, streamlining processes, improving efficiency, and enhancing productivity. In this report, we will explore the impact of

automation on businesses, the workforce, and society as a whole.

I. Benefits of Automation:

Increased Productivity: Automation allows repetitive tasks to be performed at a much faster pace, leading to higher output and productivity levels.

Improved Accuracy: Automated systems reduce human errors, leading to more reliable and precise results.

Cost Savings: Businesses can save costs on labor, as automation reduces the need for manual work and potentially minimizes the number of employees required.

24/7 Operations: Automated systems can work continuously without breaks, providing round-the-clock operations and enhanced service availability.

Enhanced Safety: Dangerous or hazardous tasks can be delegated to automated machines, reducing the risk to human workers.

II. Impact on Employment:

Job Displacement: Automation can lead to the displacement of certain jobs, particularly those that involve repetitive and routine tasks.

Creation of New Jobs: While automation eliminates some jobs, it also creates new roles, such as maintenance, programming, and supervision of automated systems.

Skill Upgradation: With automation taking over mundane tasks, there is a growing demand for a more skilled and tech-savvy workforce to operate and maintain automated systems.

III. Industries Affected by Automation:

Manufacturing: The manufacturing industry has seen significant automation adoption with the use of robotics and assembly line automation.

Retail: Automation has transformed the retail sector through self-checkout systems and automated inventory management.

Transportation: The transportation industry is embracing automation with self-driving vehicles and drone deliveries.

Finance: Automation has streamlined financial processes, like online banking and automated trading systems.



Healthcare: Automation is utilized in medical diagnostics, robotic surgery, and drug discovery, improving patient care and outcomes.

IV. Ethical Considerations:

Job Loss Concerns: Addressing potential job displacement and retraining workers for new roles is crucial to ensure a smooth transition.

Data Privacy and Security: As automation relies heavily on data, safeguarding personal information and preventing data breaches are essential.

Equity and Inclusion: Ensuring equitable access to automation benefits and opportunities is vital to avoid exacerbating social inequalities.

V. Future Outlook:

Automation will continue to evolve, integrating artificial intelligence and machine learning to handle more complex tasks. The focus will be on striking a balance between efficiency, workforce impact, and ethical considerations.

Conclusion:

Automation is a powerful tool that has revolutionized various industries, leading to increased productivity, improved safety, and cost savings. As we move forward, it is essential to carefully manage the transition to automation, ensuring that benefits are widespread and ethical concerns are addressed. Embracing automation responsibly will pave the way for a more efficient and prosperous future.

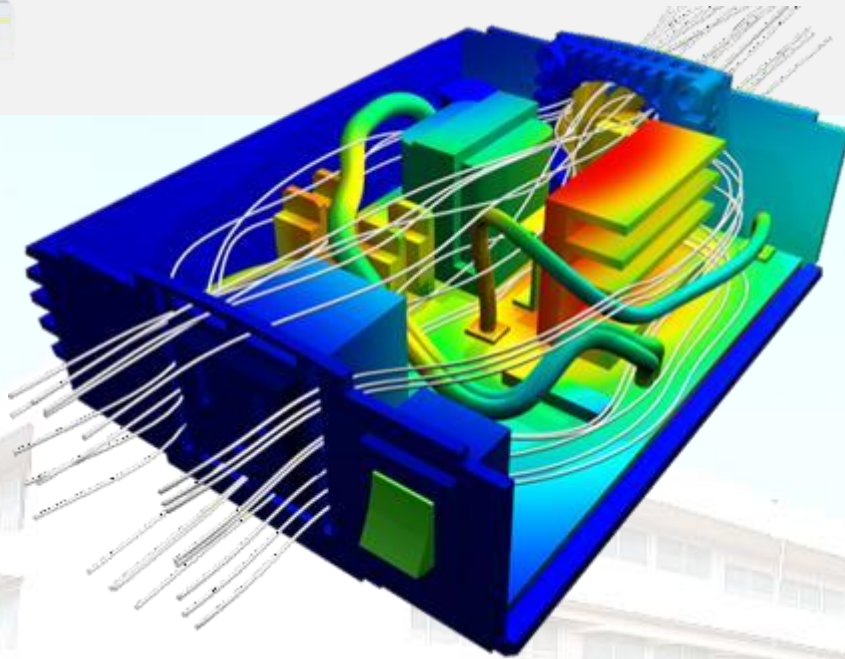


Computational Fluid Dynamics (CFD) Unleashing the Power of Simulations



Article by:

Mr. Azad Khan
4th sem



INTRODUCTION:

Computational Fluid Dynamics (CFD) is a powerful numerical analysis tool used to study the behaviour of fluid flow and heat transfer in various engineering applications. By utilizing mathematical algorithms and advanced computing resources, CFD enables engineers and scientists to simulate and analyse complex fluid phenomena that would be otherwise challenging or impossible to study experimentally. In this article, we will explore the applications, advantages, and disadvantages of Computational Fluid Dynamics.

APPLICATIONS OF COMPUTATIONAL FLUID DYNAMICS:

1. **Aerospace Engineering:** CFD is extensively used in designing and optimizing aircraft and spacecraft to improve aerodynamic efficiency and reduce drag, leading to better fuel efficiency and enhanced performance.
2. **Automotive Industry:** CFD aids in developing streamlined car designs and optimizing engine cooling systems, contributing to improved fuel economy and reduced emissions.
3. **Energy Sector:** CFD plays a vital role in designing wind turbines, solar panels, and other renewable energy systems, ensuring optimal performance and reliability.
4. **Environmental Studies:** CFD helps model pollutant dispersion, airflow patterns, and ocean currents, contributing to the understanding of environmental impacts and climate change effects.

5. Building and Architecture: CFD assists in designing energy-efficient buildings, analysing ventilation and indoor air quality, and simulating smoke evacuation in case of fire incidents.

ADVANTAGES OF COMPUTATIONAL FLUID DYNAMICS:

1. Cost-Effective: CFD simulations eliminate the need for expensive physical prototypes, leading to substantial cost savings during the design and testing phases.
2. Faster Iterations: Compared to experimental methods, CFD enables rapid iterations and design changes, accelerating the product development process.
3. Detailed Insights: CFD provides in-depth insights into fluid flow behaviour, heat transfer, and pressure distribution, enabling engineers to optimize designs for maximum performance.
4. Non-Intrusive Measurements: CFD allows for non-intrusive measurements, avoiding potential disturbances to the fluid flow being studied, which is often impossible with physical probes.
5. Versatility: CFD can be applied to a wide range of fluid systems, from simple laminar flows to highly complex turbulent flows, making it a versatile tool for various industries.

DISADVANTAGES OF COMPUTATIONAL FLUID DYNAMICS:

1. Computational Resources: CFD simulations demand significant computational power and time, especially for complex geometries and high-resolution grids, making them resource-intensive.
2. Validity of Models: The accuracy of CFD results heavily relies on the accuracy of mathematical models and assumptions used, leading to potential uncertainties in predictions.
3. Pre-processing Complexity: Creating a suitable mesh for the fluid domain is a challenging task, as it requires expertise and substantial effort to ensure accurate results.
4. Limited Experimental Data: Validating CFD results often requires experimental data, but obtaining precise and relevant data can be difficult, especially for novel or specialized cases.
5. Initial Cost: Setting up CFD software and acquiring licenses can involve a significant initial cost, making it less accessible for small businesses and individuals.

CONCLUSION:

Computational Fluid Dynamics has revolutionized engineering design and analysis, providing a deeper understanding of fluid behaviour and enabling the development of innovative and efficient solutions. Despite some challenges, the applications and advantages of CFD far outweigh its disadvantages, making it an indispensable tool for engineers and scientists in various industries, driving progress and innovation in fluid dynamics.



NANO TECHNOLOGY USED IN ROCKETS

Article by

Mr. Junaid Harlapur
4th sem

Introduction:

Nano technology has made significant advancements in various industries, and its application in rockets has opened up new possibilities in space exploration. In this article, we will explore how nano technology is used in rockets, its potential applications, as well as the advantages and disadvantages it presents.

Nano Technology in Rockets:

Nano technology involves the manipulation of materials and structures at the molecular or atomic level. In rocket technology, nano materials and processes are used to enhance various aspects of space missions, from propulsion to materials engineering.

Applications of Nano Technology in Rockets:

- Propulsion Systems:** Nano-sized particles can be used as propellants to increase thrust and efficiency. For instance, nano-sized aluminum powder can improve solid rocket propellants' burn rate, leading to enhanced performance.
- Lightweight Materials:** Nano composites can be integrated into rocket components, making them lighter, stronger, and more resistant to extreme conditions, thereby improving overall payload capacity.
- Heat Shielding:** Nanostructured coatings can provide improved thermal protection, reducing the risk of damage to rockets during re-entry into the Earth's atmosphere.
- Sensors and Communication:** Nano sensors can be employed to enhance communication and data gathering during space missions.

Advantages of Nano Technology in Rockets:

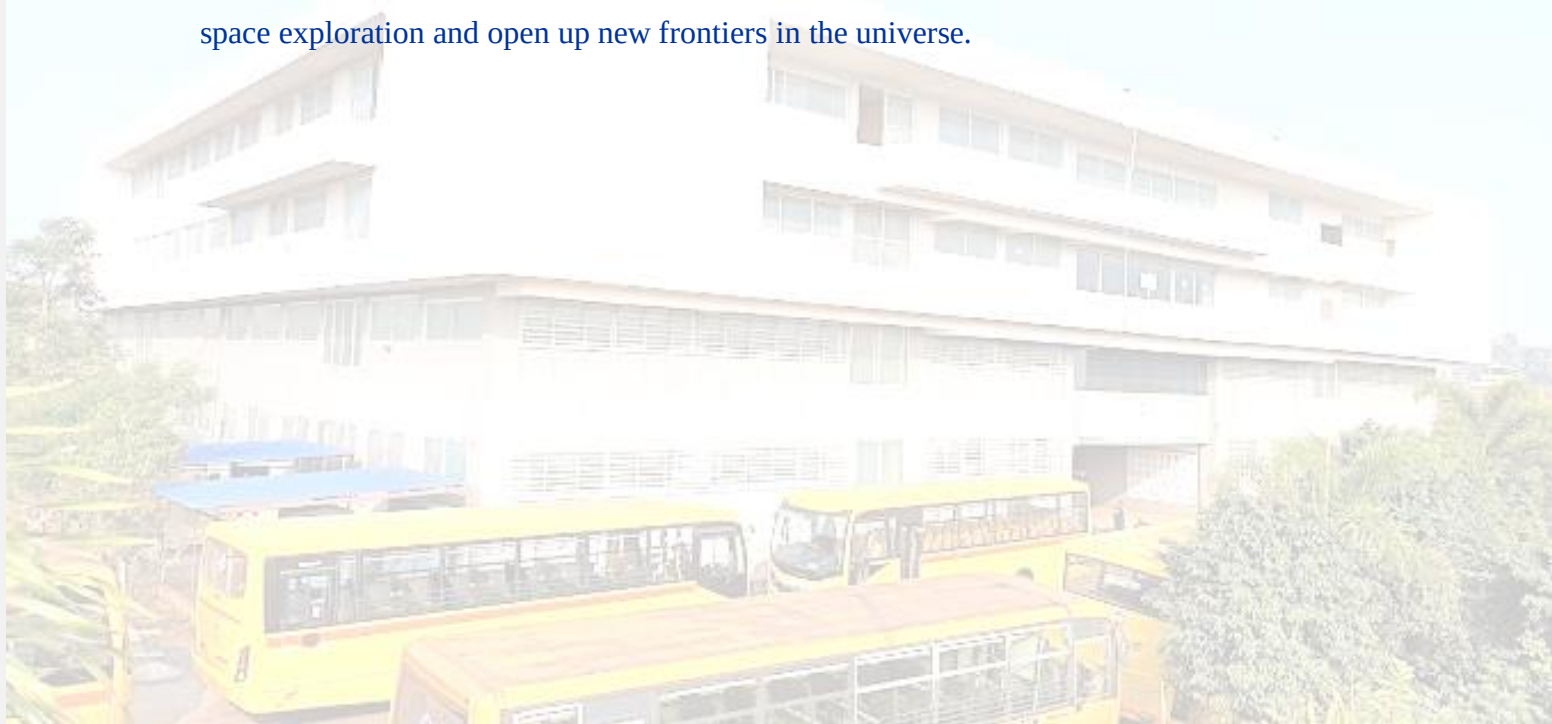
- Improved Performance:** Nano materials enable rockets to achieve higher thrust and efficiency, enhancing their payload capacity and range.
- Enhanced Safety:** Nano technology can strengthen rocket materials and improve heatshielding, reducing the risk of failure during launch and re-entry.
- Cost-effectiveness:** By optimizing materials and propulsion systems, nano technology can lead to cost reductions in rocket manufacturing and launches.
- Miniaturization:** Nano sensors and components enable the miniaturization of rocket systems, leading to more compact and efficient spacecraft.

Disadvantages of Nano Technology in Rockets:

- a. **Uncertainty:** The behaviour of Nano materials under extreme conditions, such as high temperatures and radiation, might not always be fully understood, introducing uncertainty and potential risks.
- b. **Manufacturing Challenges:** Producing nano materials on a large scale for rocket applications can be technically challenging and costly.
- c. **Environmental Concerns:** As with any new technology, the environmental impact of nano materials needs to be carefully studied to avoid potential ecological consequences.

Conclusion:

Nano technology offers promising opportunities for the advancement of rocket technology, from enhancing propulsion systems to improving materials and sensors. While it presents several advantages, such as increased performance and safety, there are challenges to be addressed, including manufacturing complexities and environmental considerations. With ongoing research and responsible implementation, nano technology could revolutionize space exploration and open up new frontiers in the universe.



Industry 4.0: Transforming the Future of Manufacturing



Article by:

Mr. AnwarHusen Matte
4th sem



Introduction:

Industry 4.0, also known as the Fourth Industrial Revolution, is a technological paradigm shift that has revolutionized the manufacturing sector. This new era is characterized by the integration of digital technologies into industrial processes, leading to enhanced efficiency, productivity, and connectivity. In this article, we will explore the applications, advantages, and disadvantages of Industry 4.0.

Applications of Industry 4.0

1. **Smart Factories:** Industry 4.0 enables the creation of intelligent manufacturing plants where machines and devices communicate and cooperate seamlessly. This interconnectivity allows for real-time data analysis, predictive maintenance, and adaptive production processes.
2. **Internet of Things (IoT):** IoT plays a crucial role in Industry 4.0 by connecting physical devices and systems through the internet. This connectivity facilitates data exchange and automation, leading to improved process control and resource optimization.
3. **Big Data and Analytics:** Industry 4.0 harnesses the power of big data and advanced analytics to make data-driven decisions. Manufacturers can collect and analyse vast amounts of data to identify patterns, optimize processes, and enhance product quality.

4. **Artificial Intelligence (AI) and Machine Learning:** AI and machine learning algorithms enable machines to learn from data, adapt, and optimize processes autonomously. This technology enhances production efficiency, quality control, and predictive maintenance.

Advantages of Industry 4.0

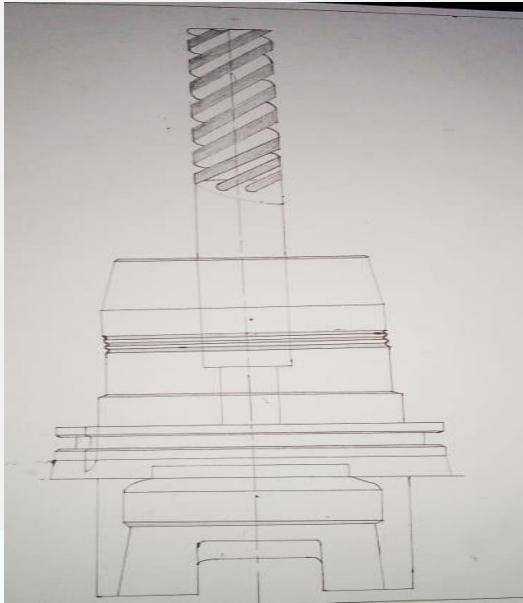
1. **Increased Efficiency:** The integration of digital technologies streamlines operations, reduces downtime, and enhances resource utilization, leading to higher overall efficiency.
2. **Enhanced Product Quality:** Real-time data analysis and predictive maintenance ensure higher product quality and reduce the likelihood of defects or errors.
3. **Cost Reduction:** Optimized production processes, predictive maintenance, and resource efficiency help reduce operational costs.
4. **Customization and Flexibility:** Industry 4.0 enables mass customization, allowing manufacturers to produce products tailored to individual customer needs efficiently.
5. **Safety and Work Environment:** Automation of hazardous tasks and the use of collaborative robots (cobots) improve workplace safety for employees.

Disadvantages of Industry 4.0

1. **High Initial Investment:** Implementing Industry 4.0 technologies requires substantial upfront investment in infrastructure, training, and software systems.
2. **Data Security Concerns:** The increased reliance on interconnected devices creates potential vulnerabilities, making data security and privacy crucial concerns.
3. **Workforce Disruption:** Automation and AI might lead to job displacement for some workers, necessitating upskilling and retraining programs.
4. **Technological Complexity:** Integrating various digital technologies and ensuring their compatibility can be challenging, especially for smaller businesses.

Conclusion:

Industry 4.0 has transformed the manufacturing landscape, offering unparalleled opportunities for increased efficiency, quality, and customization. Embracing the Fourth Industrial Revolution comes with its challenges, including initial investments and security concerns, but the potential benefits far outweigh the drawbacks. As businesses adapt and invest in advanced technologies, the potential for innovation and growth in the manufacturing sector becomes limitless.



CNC Machining tool with adaptor drawing
by Mr. Ashwin 6th semester

Art by,
Mr. Parashuram Panneri
4th Sem

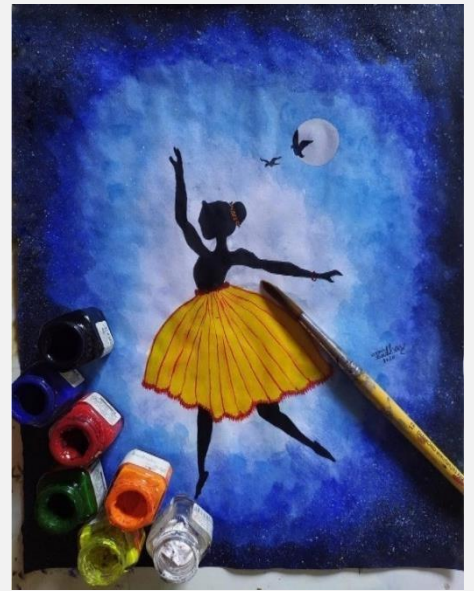
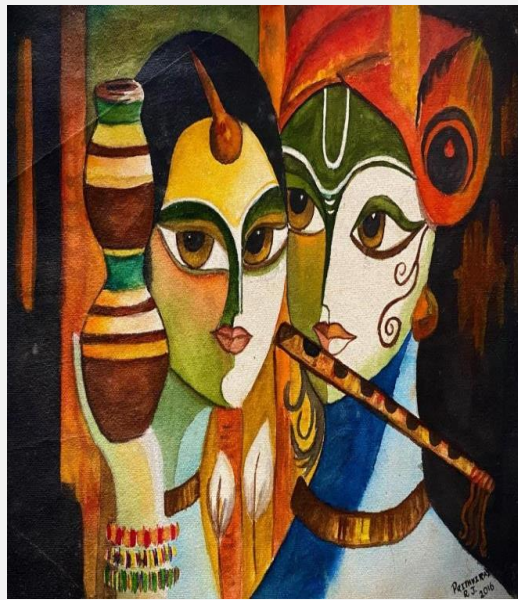


Art by,
Mr. Darshan Talawar 4th Sem



Art by,

Mr Prithviraj Jadhav
8th Sem



Art
by,

Mr AbhishekV
Kanabarkar 4th Sem





Photography by Yash

Badodekar8th Semeste



