



# SHRI SITARAMBHAJ NARANJJI PATEL INSTITUTE OF TECHNOLOGY,

MANAGED BY  
VIDYABHARTI TRUST, UMRAXH - BARDOLI



## Mech Marvel 2022

MECHANICAL ENGINEERING  
DEPARTMENT

If you can dream it, we can build it. Mechanical engineering: turning ideas into reality.

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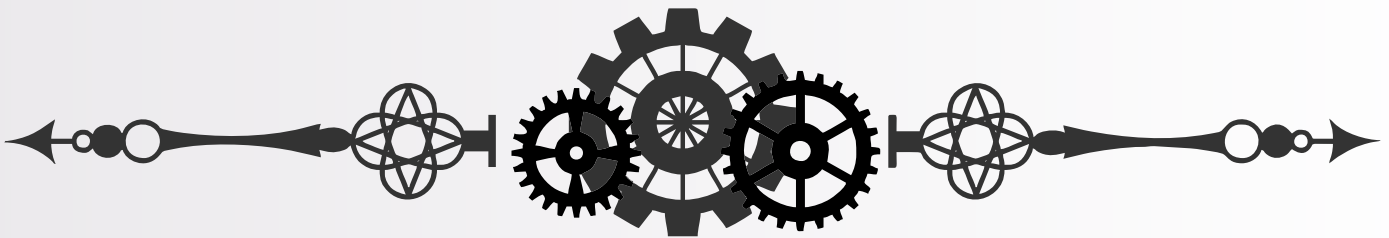
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## Vision

To be a centre of quality technical education in the field of mechanical engineering leading to competent technocrats with ethical values through state-of-the-art teaching and research methodology.



## Mission

- To impart undergraduates quality technical education along with sound technical communication skill.
- To provide the quality infrastructure, tools and teaching-learning environment.
- To inculcate qualities of leadership, teamwork and entrepreneurship with professionalism and ethical values.
- To bridge students with industries and research organizations so as to increase placement or higher studies preferences amongst the graduates.

## Program Educational Objectives

**01**

Our graduates will have qualities of an engineer with strong knowledge of fundamentals & application in the field of Mechanical Engineering.

**02**

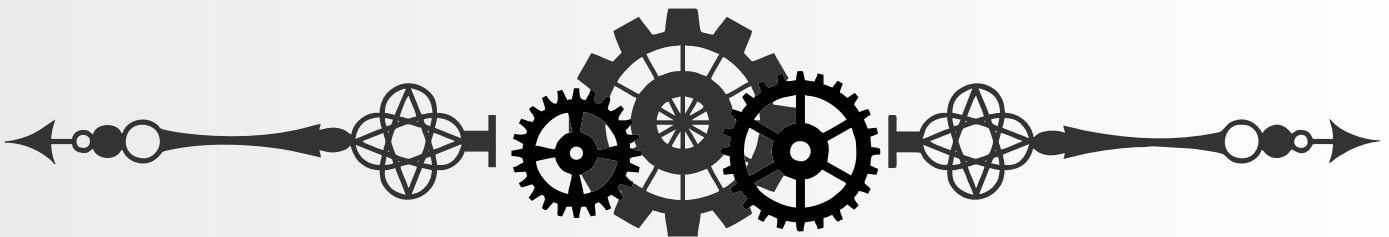
Our graduates will have knowledge of design, Modern tools and research techniques to meet societal as well as global technological challenges.

**03**

Our graduates will have the qualities of pragmatism and life-long learning in context of advancement in technology.

**04**

Our graduates will be able to serve their best for the nation.



## Program Specific Outcomes

**01**

Graduates would be able to understand and analyze mechanical systems in a discipline of thermal, fluid, energy design and production engineering.

**02**

Graduates would be able to analyze and solve complex industrial as well as research problem through an engineering concepts and various graphical, computational, experimental and mathematical tools.



## Program Outcomes

**PO 01**

**Engineering knowledge:**

Apply the knowledge of mathematics, science, engineering fundamentals, and mechanical engineering specialization to the solution of complex engineering problems.

**PO 02**

**Problem analysis:**

Identify, formulate, review research literature, and analyses complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences, and engineering sciences.

**PO 03**

**Design/development of solutions:**

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO 04**

**Conduct investigations of complex problems:**

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO 05**

**Modern tool usage:**

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO 06**

**The engineer and society:**

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the mechanical engineering practice.

**PO 07**

**Environment and sustainability:**

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO 08**

**Ethics:**

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO 09**

**Individual and team work:**

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO 10**

**Communication:**

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO 11**

**Project management and finance:**

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in mechanical engineering or multidisciplinary environments.

**PO 12**

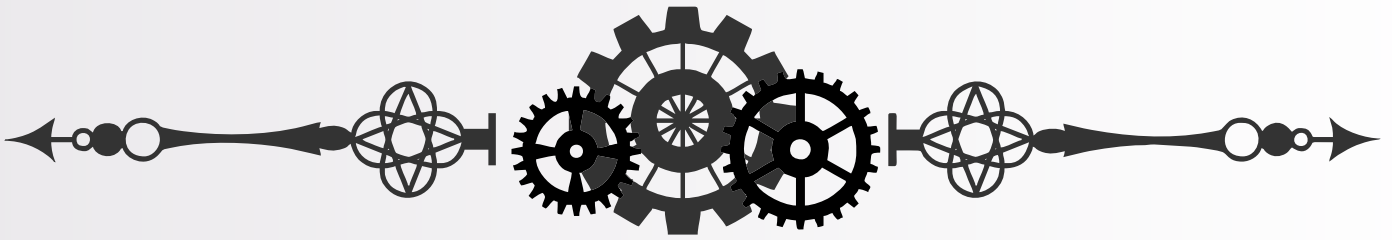
**Life-long learning:**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



**Shri. Manharbhai L. Patel**  
Hon. Managing Trustee

"Our goal is to build a long term career with leading organizations to address the critical needs of the society and foster economic development in which all stake holders can succeed and are involved in the continuous assessment and improvement process."



**Shri. Kiritbhai N. Patel**  
Secretary

**Shri. Bharatbhai S. Patel**  
Co-Secretary

**Trust Members**

**Shri. Mahendra bhai S. Patel**

**Shri. Hasmukh bhai T. Patel**

**Shri. Harshad bhai S. Patel**

**Shri. Hitesh Bhai K. Patel**

**Shri. Mahendra bhai N. Patel**

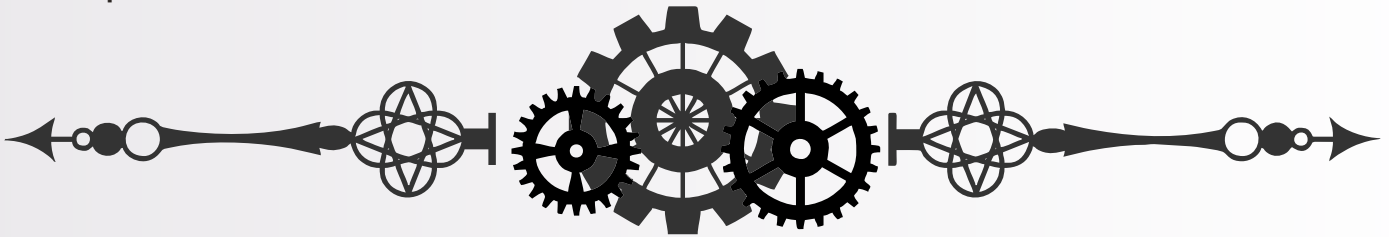
**Shri. Hemant bhai M. Patel**

**Welcome to S N Patel Institute of Technology and Research Center , Umrah**



**Dr. Piyush S. Jain**  
Principal & Professor

S. N. Patel Institute of Technology & Research Centre is a self financed technical institute offering UG and PG level courses. It was established in 2008 and managed by Vidyabharti Trust. The institute is affiliated with Gujarat Technological University (GTU) and recognized by AICTE. The institute, in all its aspects is an ideal place where students interact with faculties in the creation of new knowledge & enhance the quality of life.



**Welcome to The Mechanical Engineering Department of SNPIT&RC!**



**Dr. Arif M. Varsi**  
Head & Assistant Professor  
Mechanical Engineering

Mechanical engineering is versatile and evergreen branch of engineering. Mechanical engineer can work in various specialized area like automotive system, aerospace engineering, design engineering, dynamic system and control, power plant engineering, etc. and most importantly in software field also.

Department has well qualified and dedicated faculties with well-developed laboratories. We impart quality engineering education through sound theoretical knowledge, hands on laboratory as well as computational skill and exposure to recent technologies by visiting industries.

We are continuously arranging seminars on current trends related with mechanical engineering along with external specialized speakers. Students are trained in various Industry related software's like AUTO-CAD, PRO-E etc., to take competitive advantage and for better job opportunities.

**Sculptor of Magazine**

**Patron**



**Dr. Piyush S. Jain**  
Principal & Professor



**Dr. Arif M. Varsi**  
Head & Assistant Professor

**Chief Editor**

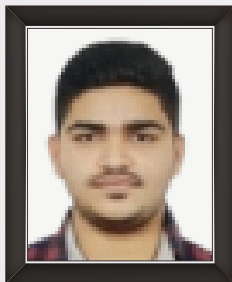


**Prof. Mayank B. Parmar**  
Assistant Professor

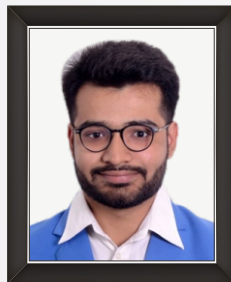


**Dr. Nirav M. Patel**  
Assistant Professor

**Editorial Board**



**Mr. Darshan Mistry**



**Mr. Mit Majithiya**



**Mr. Shivam Goswami**



**Mr. Jay Dumasiya**



**Mr. Om Panday**



**Mr. Nishant Chaudhary**



## Staff Achievements



**Dr. Arif M. Varsi**  
HOD & Assistant Professor  
arif.vars@snpitrc.ac.in

**Paper Publication:**

Influence Of Resolution On Surface Roughness During Co2 Laser Beam Machining. (International Journal of Mechanical Engineering).

A Review On Influence Of Mold Vibration And Other Process Parameters On Mechanical Properties Of Aluminum Alloy During Gravity Die Casting. (Special Issue on Recent Research on Management, Applied Sciences and Technology)



**Dr. Shakil A. Kagzi**  
Associate Professor  
shakil.kagzi@snpitrc.ac.in

**Paper Publication:**

Mathematical modelling to predict spring back in bimetallic material including material anisotropy during bending (Advances in Materials and Processing Technologies)

Theoretical and experimental investigations for geometrical error during hemispherical cavity machining on CO2 laser (Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture).

Investigation of Fused Deposition Modelling Process Parameters in 3D Printing for Composite Material (Poly Lactic Acid and Banana Fibre) (International Journal of Automotive and Mechanical Engineering)



**Dr. Hitesh S. Jariwala**  
Assistant Professor  
hitesh.jariwala@snpitrc.ac.in

**Paper Publication:**

Experimental Investigations of Jet Expansion for Hydraulic Nozzles of Different Materials. (International Journal of Engineering Trends and Technology)

**Book Chapter:**

A Comprehensive Review on Natural Fiber Reinforced Polymer Composites and Its Applications. (Trends in Applications of Polymers and Polymer Composites)



**Prof. Vishal Z. Dhimmar**  
Assistant Professor  
vishal.dhimmar@snpitrc.ac.in

**Paper Publication:**

Investigation of Fused Deposition Modelling Process Parameters in 3D Printing for Composite Material (Poly Lactic Acid and Banana Fibre) (International Journal of Automotive and Mechanical Engineering).



**Prof. Priyank P. Dave**  
Assistant Professor  
priyank.dave@snpitrc.ac.in

**Paper Publication:**

Determination of Optimally Feasible Operating Parameters for Gasification of High Ash Content Indian Coal" (Asia-Pacific Journal of Science and Technology)



**Prof. Mayank B. Parmar**  
Assistant Professor  
mayankkumar.parmar@snpitrc.ac.in

**Paper Publication:**

Pyrolysis of pellets prepared from groundnut shell and crude glycerol: in-situ utilization of pyro-gas and characterization of products. (DETRITUS - Multidisciplinary journal for Waste Resources and Residues ISSN: 2611-4135)

**Student Achievements**

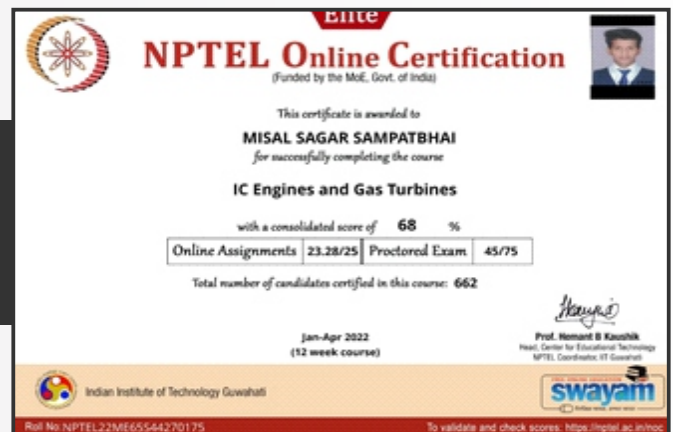


**Majithiya Mit , Darshan Mistry, Yash Mistry and Hemat Marathe** actively participated in Foot Prints 2K22, which was held at M S University Vadodara, Gujarat from March 4<sup>th</sup> to 6<sup>th</sup>, and won the 1<sup>st</sup> position on Hydrex.



**Majithiya Mit and Darshan Mistry** had actively participated in three days online workshop on "3D Modelling and Analysis in ANSYS" organized by Mechanical Engineering Department SNPIT&RC, Umrakh, Bardoli, Surat, Gujarat.

**Mishal Sagar** successfully completed 12 week Course on "IC ENGINES AND GAS TURBINES" organized by IIT Guwahati (NPTEL Swayam) during January - April, 2022.

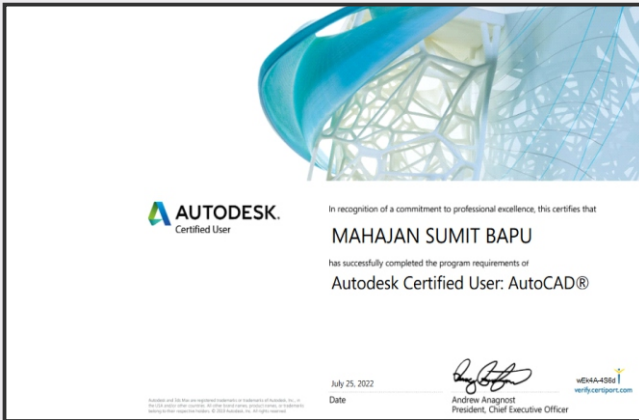


**Majithiya Mit** coordinator of the "TECHNOKRUTI 2K22" organized by Mechanical Engineering Department, SNPIT&RC, Umrakh, Bardoli, Surat, Gujarat.

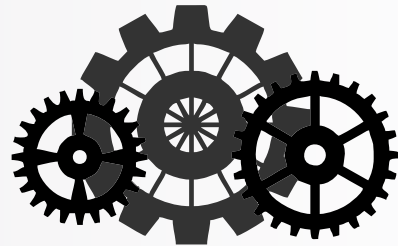
Mechanical engineering:  
the art of making things move.



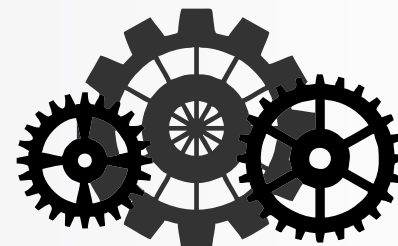
**Parth Vyas**  
Enthusiastically participated in "INSPIRE 22"  
National level Technical Festival in event  
at the Prayogshala  
organized by  
C. K. Pithawala Collage of Engineering & Technology,  
Surat, Gujarat on 11th & 12th April, 2022.



**Mahajan Sumit Bapu**  
has successfully completed the AutoCAD and Solid Work, training programme.



**Chaudhari Savankumar Ravindrabhai**  
has successfully completed the AutoCAD  
and Solid Work, training programme.







**Patel Kumpalkumar Sureshbha, Patel Mayankbhai Jitendrabhai, Rathod Ashishbhai Rameshbhai, Gamit shradhaben Ravindrabhai were awarded 2nd Rank in the event "WOOD CRAFT" at the "TECHNOKRUTI 2K22" National Level Technical Festival which was held at SNPIT&RC, Umrakh, Bardoli, Surat, Gujarat.**



**PATEL MAYANKKUMAR NAGINBHAI** has successfully completed the "CNC LATH OPERATOR", certified training programme Organized by CIPET, NAVSARI under Vanbandhu Kalyan Yojana (Government of Gujarat) from 11/07/2022 to 10/10/2022.

**PATEL KRUNALKUMAR NILESHBHAI** has successfully completed the "CNC LATH OPERATOR", certified training programme Organized by CIPET, NAVSARI under Vanbandhu Kalyan Yojana (Government of Gujarat) from 11/07/2022 to 10/10/2022.





## Department Activity

The Workshop entitled  
“Advanced Manufacturing processes and NDT” Organized by  
Dr. Kagzi A. Shakil & Prof. Milan R. Patel (Coordinators) and Dr. Arif Varsi (Department head)  
Mechanical Engineering Department, SNPIT-Umrakh On 13<sup>th</sup> October, 2022.



Introduction and demonstration to Vertical Machining Center



Welding



NDT( Non Destructive Testing)



Introduction to casting Process

The Event on  
“GROUP DISCUSSION”  
Organized by: Training & Placement Cell and Mechanical Engineering Department,  
SNPIT & RC, Umrakh on 10<sup>th</sup> March, 2022

 **S. N. Patel Institute of Technology & Research Centre, Umrakh**  
(A Vidyabharti Trust Institution)

**Training & Placement and  
Mechanical Engineering Department  
Organized**

**Group  
Discussion**

**Date: 10 / 03 / 2022** **Time: 02:00 pm onward**

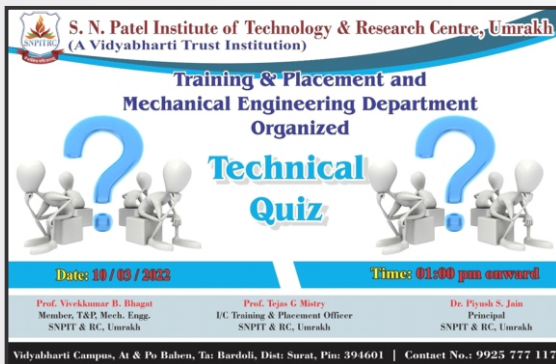
Prof. Vivekumar B. Bhatnagar Member, T&P, Mech. Engg. SNPIT & RC, Umrakh	Prof. Tejas G. Mistry I/C Training & Placement Officer SNPIT & RC, Umrakh	Dr. Piyush S. Jain Principal SNPIT & RC, Umrakh
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Vidyabharti Campus, At & Po Baben, Ta: Bardoli, Dist: Surat, Pin: 394601 | Contact No.: 9925 777 117





**The Event on  
“Technical Quiz Session”  
Organized by: Training & Placement Cell and Mechanical Engineering Department,  
SNPIT & RC, Umrakh on 10<sup>th</sup> March, 2022**



**S. N. Patel Institute of Technology & Research Centre, Umrakh**  
(A Vidyabharti Trust Institution)

**Training & Placement and  
Mechanical Engineering Department  
Organized**

**Technical  
Quiz**

**Date: 10 / 03 / 2022** **Time: 01:30 pm onward**

**Prof. Vivek Kumar D. Bhagat**  
Member, T&P Meech. Engg.  
SNPIT & RC, Umrakh

**Prof. Tejas G. Mistry**  
I/C Training & Placement Officer  
SNPIT & RC, Umrakh

**Dr. Piyush S. Jain**  
Principal  
SNPIT & RC, Umrakh

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**The Industrial Visit at  
“BHARKADEVI ICE-CREAM FACTORY”  
Organized by: Training & Placement Cell and Mechanical Engineering Department,  
SNPIT & RC, Umrakh on 12<sup>th</sup> October, 2022 for Student of 4<sup>th</sup> Year - 7<sup>th</sup> Sem.**





**The Industrial Visit at  
"JAY METAL TECH"**

**Organized by: Training & Placement Cell and Mechanical Engineering Department,  
SNPIT & RC, Umrahk on 13<sup>th</sup> October, 2022 for Students of 3<sup>rd</sup> Year - 5<sup>th</sup> Sem.**

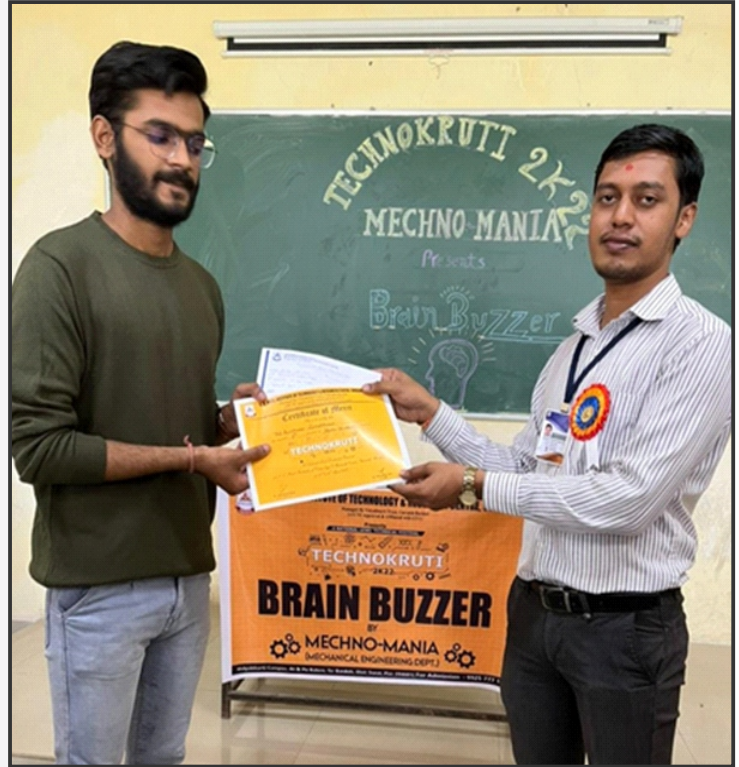




**Brief of Technokruti 2K22  
Mechanical Department Events  
(27<sup>th</sup> & 28<sup>th</sup> April, 2022)**



**Wood craft and Ship Wreck events  
under MECHNO-MANIA**



**BRAIN BUZZER events  
under MECHNO-MANIA**



**CHAI PE CHARCHA events  
under MECHNO-MANIA**



**MIND OVER LETTER events  
under MECHNO-MANIA**



**POSTER PRESENTATION events  
under MECHNO-MANIA**



**Racketeering events  
under MECHNO-MANIA**



## MOU Signed

Memorandum of Understanding (MOU) Between Mechanical Engineering Department of SNPIT & RC, Umrahk & RAYZON GREEN ENERGIES for "Skill Development, Outcome Based Training, Internship, Placement. R&D Services and Related Services.







**Campus Placement  
by Company**

**SAARA GEMS**



**HARON R & D  
AND  
ARG EQUIPMENTS  
PVT LTD.**





## Graduation Day

The Graduation day Ceremony was celebrated on 28<sup>th</sup> March, 2023



### BATCH: 2019-2020





## Robotics in Mechanical Engineering: The Future of Automation



**Tandel Keval**  
190490119054

The intersection of mechanical engineering and robotics has given rise to ground breaking innovations that are transforming industries, from manufacturing and healthcare to space exploration and beyond. Robotics, as a branch of mechanical engineering, offers unprecedented possibilities for automation and precision. In this article, we explore the exciting world of robotics and its profound impact on mechanical engineering.

### The Role of Robotics in Mechanical Engineering

Mechanical engineering is the backbone of robotics, providing the foundational knowledge and expertise required to design and build robotic systems. Robotics, in turn, has expanded the horizons of mechanical engineering by introducing cutting-edge technologies and applications.

**Manufacturing Automation:** Robotics has revolutionized manufacturing by introducing automation in assembly lines. Robotic arms, guided by sophisticated software and sensors, can perform repetitive tasks with unparalleled precision and speed. This not only increases efficiency but also reduces errors and labour costs.

Robotic systems are used in precision engineering tasks such as 3D printing and CNC machining. Robots can create complex geometries and structures with micron-level accuracy, making them indispensable in industries where precision is paramount.

**Surgical Robots:** The field of healthcare has benefited immensely from robotic advancements. Surgical robots assist surgeons in performing minimally invasive procedures with greater precision, reducing patient trauma and recovery times.

Robots play a pivotal role in space exploration. Robotic rovers like NASA's Mars rovers, for example, have expanded our understanding of other planets. These machines are designed to endure harsh environments and execute complex tasks in distant locations.

In agriculture, robots are used for tasks such as planting, harvesting, and monitoring crops. These robots improve crop yield, reduce resource consumption, and lessen the need for manual labour.

### Challenges and Future Directions

While robotics in mechanical engineering holds immense promise, it also presents certain challenges:

The design and programming of advanced robotic systems are highly complex tasks that require interdisciplinary expertise in mechanical engineering, computer science, and electronics.

Developing and implementing robotic systems can be expensive, particularly for smaller businesses. However, as technology evolves, costs are gradually decreasing, making robotics more accessible.

The integration of robots into society raises ethical concerns, particularly in fields like AI and robotics. Ensuring robots operate safely and ethically is an ongoing challenge.

Looking ahead, the future of robotics in mechanical engineering is bright:

Artificial intelligence (AI) is becoming increasingly integrated with robotics, allowing machines to learn and adapt to their environments. This will lead to more autonomous and intelligent robots.

Collaborative robots, or "robots," will become more prevalent. These robots can work alongside humans, enhancing productivity and safety in various industries.

Robotics will continue to play a pivotal role in space exploration, with plans for sending more advanced robotic missions to distant planets and celestial bodies.



## BS6 Engine: A Technological Marvel in Mechanical Engineering



**Niyoliya Dhaval**  
200490119510

In the realm of mechanical engineering and automotive technology, the transition from BS4 (Bharat Stage 4) to BS6 (Bharat Stage 6) engines represents a remarkable leap forward in terms of emissions control and engine efficiency. The BS6 standard, implemented in India in April 2020, imposes stringent regulations on vehicular emissions. In this article, we delve into the significance and technological advancements of BS6 engines.

### BS6: The Need for Change

The need to switch from BS4 to BS6 engines stemmed from environmental concerns, primarily the alarming levels of air pollution in India's urban centers. BS6 norms mandate a significant reduction in the emission of harmful pollutants, such as nitrogen oxides (NOx), particulate matter (PM),

hydrocarbons (HC), and carbon monoxide (CO), compared to their BS4 counterparts.

### Key Technological Advancements

#### Improved Combustion

BS6 engines employ advanced combustion techniques, including direct fuel injection and optimized air-fuel mixture ratios. This results in more complete and efficient combustion, reducing emissions significantly.

#### Selective Catalytic Reduction (SCR)

Many BS6-compliant diesel engines incorporate SCR technology, which involves injecting a urea-based solution (ad Blue) into the exhaust stream to convert NOx into harmless nitrogen and water vapour. This process significantly reduces nitrogen oxide emissions.

#### Particulate Filters

To control particulate matter emissions, BS6 engines often feature particulate filters that trap and remove tiny soot particles from the exhaust gases. These filters are especially prevalent in diesel-powered vehicles.

#### Electronic Control Units (ECUs)

Modern BS6 engines are equipped with highly sophisticated ECUs that monitor and control various engine parameters in real-time. This allows for precise control of combustion, exhaust gas recirculation (EGR), and after treatment systems, ensuring optimal performance and minimal emissions.

#### Enhanced Sensors and Feedback Loops

BS6 engines incorporate a plethora of sensors to continuously monitor engine conditions and emissions. This data is used to fine-tune engine operation for maximum efficiency and emissions reduction.

### Benefits of BS6 Engines

**Environmental Benefits:** The primary goal of implementing BS6 norms is to reduce air pollution and improve air quality. BS6 engines are significantly cleaner, emitting fewer pollutants and greenhouse gases.

**Fuel Efficiency:** The technological advancements in BS6 engines often result in improved fuel efficiency. This not only reduces operating costs for vehicle owners but also decreases overall fuel consumption and its associated environmental impact.

**Health Benefits:** Cleaner air, thanks to BS6 engines, has a direct positive impact on public health. Reduced emissions translate into fewer cases of respiratory diseases and other health issues caused by air pollution.

**Global Compliance:** The move to BS6 aligns India with global emission standards, making it easier for automakers to develop and market vehicles that meet international regulations.

## Advancements in Lightweight Composite Materials in Mechanical Engineering



**Darshan Mistry**  
200490119519

In the ever-evolving field of mechanical engineering, the quest for lighter yet stronger materials is a perpetual pursuit. This endeavor has led to significant advancements in lightweight composite materials, revolutionizing industries such as aerospace, automotive, and manufacturing. These materials combine the strength of traditional materials with the added benefits of reduced weight, making them indispensable in the modern engineering landscape.

One of the most significant advantages of lightweight composite materials is their exceptional strength-to-weight ratio. Composites are typically made by combining two or more materials with distinct properties, such as fiberglass and epoxy resin. This synergistic combination results in materials that are not only strong but also significantly lighter than their

conventional counterparts like steel or aluminium. As a result, engineers can design and manufacture components that can withstand high loads while reducing overall weight, leading to improved fuel efficiency and performance in various applications.

Aerospace engineering has been a primary beneficiary of lightweight composites. Aircraft manufacturers have increasingly adopted composites in the construction of aircraft components, such as wings, fuselages, and interior structures. By using lightweight composite materials, they can reduce the weight of the aircraft, which translates into lower fuel consumption and increased payload capacity. Additionally, these materials exhibit excellent resistance to corrosion, extending the lifespan of critical aerospace components.

The automotive industry has also embraced lightweight composites to address the ever-pressing need for fuel efficiency and emission reduction. Carbon fiber-reinforced composites, for instance, are now commonly used in the manufacturing of lightweight body panels, chassis components, and interior parts. These materials not only reduce vehicle weight but also improve overall safety by enhancing impact absorption. As electric vehicles gain prominence, the weight savings offered by composites become even more critical in extending battery range.

In the realm of manufacturing, lightweight composites are transforming the production of consumer goods, sports equipment, and even infrastructure. Tennis rackets, bicycles, and prosthetic limbs are just a few examples of products benefiting from the use of advanced composite materials. In construction, composite reinforcement bars are replacing traditional steel, offering higher strength-to-weight ratios and improved resistance to environmental factors like corrosion and rust.

The success of lightweight composite materials in mechanical engineering also stems from their versatility. Engineers have the flexibility to tailor composites to specific applications by adjusting the type and arrangement of materials and controlling the curing process. This versatility allows for the creation of materials with desired properties, such as stiffness, thermal conductivity, and electrical conductivity, making composites suitable for a wide range of applications.

Despite their numerous advantages, challenges remain in the widespread adoption of lightweight composite materials. The cost of production and recycling processes, as well as the need for specialized knowledge in working with composites, can be barriers. Nonetheless, research and development efforts continue to drive innovation in this field, seeking to overcome these challenges and unlock the full potential of lightweight composites in mechanical engineering.