GLOBAL ACADEMY OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

NEWS LETTER

AUG 2024-JAN 2025

A SEMESTER OF GROWTH & INNOVATION

Capturing the exciting workshops, industrial connects, guest lectures, and student achievements that defined the Mechanical Engineering Department this semester.

STUDENT ACTIVITES

Student activities throughout the year showcased active participation in workshops, competitions, cultural programmes, and technical events, reflecting the department's vibrant and engaging learning environment.

INDUSTRIAL VISIT

The Industrial Visit offered students a valuable opportunity to observe real-time industrial systems and enhance their practical understanding.

HOW COULD THAT BE?

Through this newsletter, we capture the collaborative efforts of students and faculty, highlighting their involvement in workshops, research, cultural events, industrial visits, and institutional activities.

GLOBAL ACADEMY OF TECHNOLOGY

INSTITUTE VISION

Become a premier institution imparting quality education in engineering and management to meet the changing needs of society.

INSTITUTE MISSION

- M1: Create environment conducive for continuous learning through quality teaching and learning processes supported by modern infrastructure.
- M2: Promote Research and Innovation through collaboration with industries.
- M3: Inculcate ethical values and environmental consciousness through holistic education programs

DEPARTMENT VISION

Become one of the leading providers of education in mechanical engineering with emphasis on research, development and innovation for the benefit of society.

DEPARTMENT MISSION

- M1: Impart quality technical education in the field of mechanical engineering through excellent teaching-learning process, modern infrastructure and computing tools.
- M2: Prepare students for successful careers by providing placements and encouraging research, development and innovation through industry-institute interaction.
- M3: Instill professional ethics and environmental consciousness amongst students through inclusive development programs.

GLOBAL ACADEMY OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs) of the DEPARTMENT

PEO of Graduate students in Mechanical Engineering aims to have:

- **PEO1:** Engineering competence, critical thinking, creativity, and ethical inclusivity in professional practice.
- **PEO2:** Continuous intellectual growth through advanced education, professional development, independent inquiry, and experiential learning.
- **PEO3:**Leadership and teamwork excellence throughout professional careers.

PROGRAM SPECIFIC OUTCOMES (PSOs) of the DEPARTMENT

After successful completion of Mechanical Engineering Program, the graduates will be able to:

- **PSO1:** Specify, design, and analyze machine elements using CAD/CAE software.
- **PSO2:** Evaluate thermal performance of Heating, Ventilation & Air-Conditioning systems, electronic systems, Solar Roof Top Photo-Voltaic systems using experimental approach or /and CFD tools and design these systems for better performance.
- **PSO3:** Develop composite materials, manufacturing processes and products in an efficient, safe and cost-effective manner.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

- **PO1:** Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- **PO2:** Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
- **PO3:** Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5).
- **PO4:** Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- **PO5:** Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).
- **PO6:** The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- **PO7:** Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).
- **PO8:** Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- **PO9:** Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
- **PO10:** Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- **PO11:** Life-Long Learning: Recognize the need for, and have the preparation and ability for- (i) independent and life-long learning,
  (ii) adaptability to new and emerging technologies and
  (iii) critical thinking in the broadest context of technological change. (WK8).

GUEST LECTURES

A guest lecture titled "Empowering Careers: Internship Opportunities for Mechanical Engineering Students" was delivered by Mr. Shyam Balaji S for the 7th semester students.
Mr. Shyam Balaji S, an experienced professional with a strong background in mechanical engineering career development and industry training, served as the resource person for the session.

SI NO	Name of the Course/Program	Date	No. of Students Attended	Resource Person	Sem
1	Empowering Careers: Internship Opportunities for Mechanical Engineering Students	16-01-2025	46	Mr. Shyam Balaji S	VII
2	Placement Advisory Counselling and Training	17-01-2025	29	Dr A Sreedhar Kumar	V

A session on Placement Advisory, Counselling, and Training was conducted for the 5th semester students, aimed at enhancing their interview readiness and career planning, with Dr. A. Sreedhar Kumar serving as the resource person.

PROGRAMS ORGANISED

Sl.No	Name of the Professional Societies/Bodies, Chapters, Clubs	Name of the Event	National/International level	Date of Event (DD/MM/YYYY)
1	Bureau of Indian Standards Club(BIS)	Standard Quiz competition	State	16/12/2024

INDUSTRIAL VISIT

The 3rd semester students were divided into two groups, with one visiting Alliage Castings and the other visiting Wipro 3D.

The visits provided exposure to both traditional casting processes and advanced additive manufacturing technologies, enriching students' practical understanding of modern engineering.

SI NO	Semester	Industry Visited	Date of Visit	Subject Mapping
1	III Sem	Alliage Castings	11-08-2024	Material Science and Engineering, Manufacturing Process
2	III Sem	Wipro 3D	11-08-2024	Material Science and Engineering, Manufacturing Process
3	IV Sem	Magod Laser-Jigani plant	20-08-2024	Manufacturing Process
4	-	CMTI Bangalore-Work shop	28-08-2024	IIOT implementation in metal casting and Demonstration

NUMBER OF FUNCTIONAL MEMORANDUM OF UNDERSTANDING (MoU)s ACTIVE FOR THE ACADEMIC YEAR

SI NO	Name of the institution/ industry/ corporate house	Year of signing MoU	Duration
1	GAT – Toyota Centre of Excellence	2018	21-06-2018-Still active
2	Central Machine Tool Institute	2024	01-01-2025 – 31-12-2025
3	Bharat Dome Innovations Pvt. Ltd.	2024	09-10-2024 – 09-10-2027

VALUE ADDED PROGRAMS

A Value Added Program on Robotics Workshop with ESP32 was conducted from 25/11/2024 to 29/11/2024, providing students with hands-on experience in robotics, microcontroller programming, and automation concepts.

The workshop was coordinated by Dr. Ravikumar D V and Ms. Asha P B, and saw the active participation of 41 students.

The program enhanced students' technical skills and introduced them to practical robotics applications using the ESP32 platform

SI NO	Title of the Event	Type of Event	Date From - To	Name of Co-ordinators	Event Conducted with Colloboration with external Agency	SEM
1	Robotics Workshop With ESP32	Workshop/ VAP	25-11-2024- 29-11-2024	Dr. Ravikumar D V Ms.Asha P B	Newro Tech LLP	4,6

MOOC COURSE

SL. NO	STUDENT NAME	USN	COURSE REGISTERED	DATE
1	P.S.Sudarshan rao	1GA22ME422	PG Diploma in Piping Design Engineering	12-7-2024
2	Shashi Preetham	1GA21ME014	An online course on SolidWorks - Beginners	11-7-2024
3	H. Ajay Rao	1GA21ME005	An online course on Introduction to Microsoft Excel	11-7-2024
4	B.Dheemanth Prakash	1GA21ME002	An online course on Master solidworks 3D CAD using Real world Examples	4-7-2024

STUDENT ACTIVITIES

SI NO	Name of the student	USN	Name of the Event	Date of Event	Venue
1	S. Prajeet Yadav Pushya MS Chandanaa MN	1GA23ME030 1GA23ME029 1GA23ME004	Bangalore Tech Summit	19-11-2024 to 20-11-2024	Bangalore
2	S. Prajeet Yadav Pushya MS Chandanaa MN	1GA23ME030 1GA23ME029 1GA23ME004	Vaimaanik 2024	29-11-2024 to 30-11-2024	Global Academy of Technology
4	Chiranjeevi.V	1GA21ME003	Manufacturing Technology Quiz Contest	26-01-2025	IMTEX 2025
5	B Dheemanth Prakash	1GA21ME002	Manufacturing Technology Quiz Contest	26-01-2025	IMTEX 2025
6	Prabhanjan G.Shastri	1GA21ME011	Manufacturing Technology Quiz Contest	26-01-2025	IMTEX 2025
7	H.Ajay	1GA21ME005	Certificate of Internship completion of ACE	10-08-2024	
8	Chiranjeevi.V	1GA21ME003	Participating in IMTEX 2025 for Manufacturing Technology Quiz Contest	28-01-2025	IMTEX 2025

9	B Dheemanth Prakash Niranjan Kumar Chiranjeevi.V Prabhanjan G.Shastri	1GA21ME002 1GA22ME437 1GA21ME003 1GA21ME011	Participating in IMTEX 2025 for outstanding research work and prresentation on 'Design and Fabrication of Automatic Sieving Machine"	28-01-2025	IMTEX 2025
10	B Dheemanth Prakash	1GA21ME002	Participating in IMTEX 2025 for Manufacturing Technology Quiz Contest	28-01-2025	IMTEX 2025
11	Prabhanjan G.Shastri	1GA21ME011	Participating in IMTEX 2025 for Manufacturing Technology Quiz Contest	28-01-2025	IMTEX 2025

NPTEL ONLINE CERTIFICATION CLEARED BY FACULTIES

SI NO	Name of the faculty	Title of the programme	Duration (from - to) (DD-MM-YYYY)
1	Mrs.Savitha D.C	NPTEL online course on "The Joy of computing using Python".	July-October 2024
2	Dr.Rajesh.R	NPTEL online course on "Engineering Metrology"	July-October 2024
3	Dr.G.R. Gurunagendra	NPTEL online course on" Basics of Mechanical Engineering"	July-October 2024

STUDENTS PARTICIPATION IN EXTRA CURRICULAR ACTIVITIES

Sl. No	Name of the Student	Name of the event	State/National/International event	Date of the event
1	Chandanaa MN	Comic con (volunteer)	-	18-01-2025 to 19-01-2025
1	Kusuma.B	Kannada Dindima 2024	State Event	08-11-2024 to 09-11-2024
2	Kusuma.B	CATC/IGC RDC 2024-25 of NCC	National Event	15-10-2024 to 24-10-2024
3	Kusuma.B	Combined Annual Training Camp-II	National Event	11-09-2024 to 20-09-2024
4	Kusuma.B	Independence day Parade 2024	National Event	15-08-2024

FACULTY PUBLICATIONS

Dr.Ravi Kumar.V Presented a paper in "International conference on Materials for Energy, Environment and Healthcare(MEEHCON-24) on 20th Dec 2024.

FACULTY DEVELOPMENT PROGRAM ATTENDED BY FACULTIES

SI NO	Name of the teacher who attended the program	Title of the programme	Duration
1	Mr.R.Kiran	FDP on "Advanced Functional Materials(AFM 2024)"	29-07-2024 to 9-08-2024
2	Mr.Poorna chandra	FDP on "Advanced Functional Materials(AFM 2024)"	29-07-2024 to 9-08-2024
3	Mrs.Savitha D.C	FDP on "Next Gen-cooling solutions:Emerging trends and Future Directions"	05-08-2024 to 10-08-2024
4	Dr.Shreekala.N	FDP on "Next Gen-cooling solutions:Emerging trends and Future Directions"	05-08-2024 to 10-08-2024
5	Dr.Ravi Kumar.V	National level seminar on "Manufacturing & Industry 4.0"	11-11-2024 to 12-11-2024
6	Mrs.Asha.P.B	FDP on "Advanced Functional Materials(AFM 2024)"	29-07-2024 to 9-08-2024
7	Dr.Shreekala.N	FDP on "Master the ART of Research paper writing through effective use of AI Tools"	23-12-2024 to 30-12-2024
8	Dr.Bharat.V	International conference on Transformative Innovations in science, Technology,Nursing and Medical sciences	27-12-2024 to 28-12-2024
9	Dr.Vijay Tambrallimath	ATAL FDP on" navigating SDGs: A Faculty Guide to sustainability Achievement"	20-01-2025 to 25-01-2025

10	Dr.V.Ravi Kumar	FDP on" Emerging Advancements in Electric Vehicle Technology"	27-01-2025 to 31-01-2025
11	Dr.Asha.P.B	FDP on" Emerging Advancements in Electric Vehicle Technology"	27-01-2025 to 31-01-2025
12	Mr.Poornachandra	FDP on" Emerging Advancements in Electric Vehicle Technology"	27-01-2025 to 31-01-2025
13	Mr.R.Kiran	FDP on" Emerging Advancements in Electric Vehicle Technology"	27-01-2025 to 31-01-2025
14	Dr.Bharat.V	FDP on Research Manuscript, Patent , Thesis Drafting and Free Publication Process(FDP Research Pro Tech Mastery 2025)	03-01-2025 to 11-01-2025

TECHNICAL ARTICLES BY STUDENTS

SELF-HEALING MATERIALS: THE FUTURE OF SMART ENGINEERING MATERIALS

By: Rekhashree C
USN : 1GA22ME012
Department : Mechanical Engineering
College : Global Academy of Technology

Introduction

In engineering and construction, materials often develop cracks, scratches, or structural damage over time due to stress, environmental conditions, or repeated usage. These defects can reduce the strength and lifespan of structures and increase maintenance costs. To overcome this issue, scientists have developed an innovative concept known as self-healing materials. Self-healing materials are advanced materials that have the ability to automatically repair damage without human intervention. Inspired by natural healing processes found in biological systems, these materials can restore their functionality and extend the life of engineering structures.

What Are Self-Healing Materials?

Self-healing materials are a type of smart material that can repair cracks or damage automatically. Similar to how human skin heals after an injury, these materials can restore their original structure when damage occurs. The concept of self-healing materials was introduced in the early 2000s and has since gained attention in the fields of material science and engineering. These materials contain special components such as microcapsules, healing agents, or reversible chemical bonds that activate when damage occurs.

Working Mechanism of Self-Healing Materials

Self-healing materials use different mechanisms to repair damage. One common method is the microcapsule approach. In this technique, tiny capsules filled with liquid healing agents are embedded within the material. When a crack forms, the capsules break and release the healing liquid. This liquid fills the crack and solidifies, restoring the material.

Another approach involves vascular networks, where small channels are built inside the material. These channels carry healing agents that flow to the damaged area and repair the crack. Some materials also use reversible chemical bonds that can break and reform under certain conditions such as heat or light, allowing the material to heal itself.

Applications of Self-Healing and Repair Technologies in Mechanical Engineering

In mechanical engineering, metal components such as gears, turbine blades, engine parts, and structural elements are constantly exposed to stress, temperature variations, and fatigue. Over time, these conditions can cause cracks, deformation, or surface damage in metals. To improve durability and reduce maintenance, engineers are developing advanced material technologies that can repair or restore metal components. Some important technologies used for metal repair and recovery are explained below.

1.Self-Healing Metal Alloys

Self-healing metal alloys are advanced materials capable of repairing small cracks automatically under high temperature or stress conditions. In these alloys, atomic diffusion and microstructural changes allow the metal to close micro-cracks before they grow larger. This technology is particularly useful in high-temperature environments such as jet engines, gas turbines, and aerospace components where metal fatigue is common.

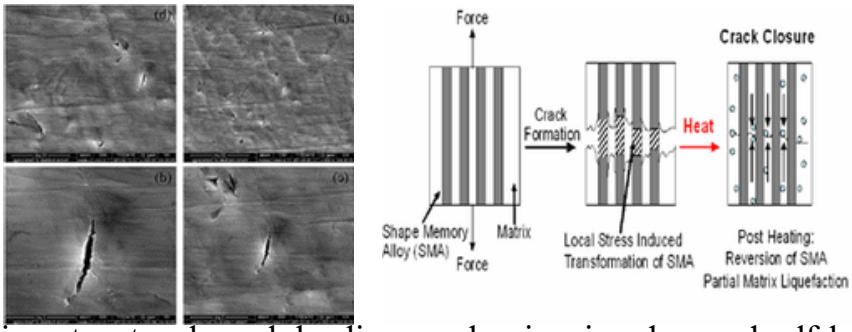

Figure 1: Microstructural crack healing mechanism in advanced self-healing metal alloys.

2. Shape Memory Alloys (SMA)

Shape memory alloys are special metals that can return to their original shape after deformation when exposed to heat. A common example is Nickel-Titanium (Nitinol). When the material is bent or deformed, heating it allows the atoms to rearrange and restore the original structure. These materials are widely used in aerospace systems, robotics, actuators, and mechanical control devices.

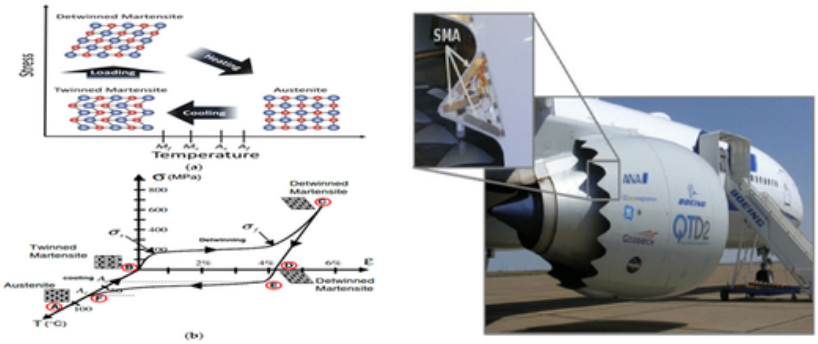

Figure 2: Shape Memory Alloy (Nitinol) returning to its original shape when heated.

3. Metal Repair through Precipitation Mechanism

Certain advanced steels and aluminum alloys can slow down or repair micro-cracks through precipitation of atoms or particles within the material. These particles accumulate around the crack region and help stop further crack growth. This mechanism improves the strength and fatigue resistance of metals used in mechanical structures, heavy machinery, and industrial equipment.

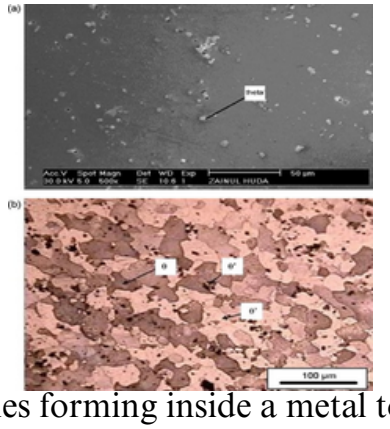

Figure 3: Precipitation particles forming inside a metal to stop crack propagation.

4. Laser Metal Repair Technology

Laser metal repair, also known as laser cladding or laser metal deposition, is a modern technique used to repair damaged metal parts. In this process, a high-energy laser melts metal powder and deposits it onto worn or cracked surfaces to rebuild the component. This technology is widely used to repair turbine blades, molds, cutting tools, and aerospace components.

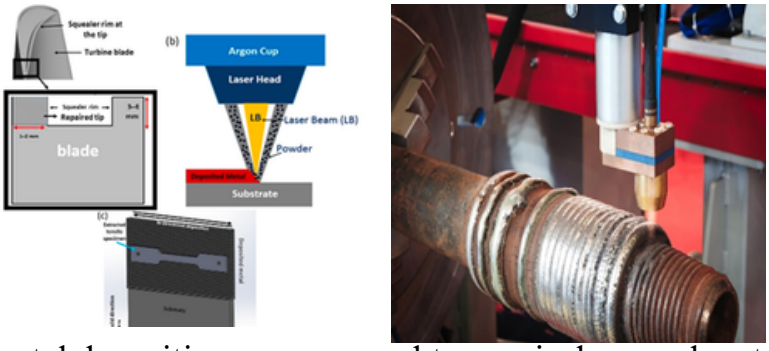

Figure 4: Laser metal deposition process used to repair damaged metal components.

Advantages of Self-Healing Materials

Self-healing materials offer several advantages compared to conventional materials. They can significantly increase the durability and reliability of structures. By repairing damage automatically, these materials reduce maintenance costs and improve safety. They also contribute to sustainability by reducing the need for frequent repairs and replacements, thereby minimizing material waste.

Challenges and Limitations

Although self-healing materials offer many benefits, they still face certain challenges. The production cost of these materials is currently higher than traditional materials. In some cases, the healing process may not completely restore the original strength of the material. Researchers are actively working to improve the efficiency, durability, and affordability of self-healing materials to make them more suitable for large-scale industrial applications.

Future Scope

Self-healing and repair technologies are expected to play an important role in future mechanical engineering systems. Advanced materials such as self-healing alloys and shape memory metals can improve the durability of critical components like turbine blades, gears, and engine parts. These technologies may significantly reduce maintenance costs and increase the lifespan of mechanical equipment used in aerospace, automotive, and energy industries. With further research and development, such smart materials could become an essential part of modern mechanical design and manufacturing.

Conclusion

Self-healing materials represent a revolutionary advancement in material science. Their ability to repair damage automatically can improve the lifespan, safety, and efficiency of engineering structures. Although the technology is still developing, continued research and innovation are expected to make self-healing materials widely used in the future. This technology has the potential to transform the way materials are designed and used in modern engineering.

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