AUG 2025-JAN 2026

NEWSLETTER

Turning knowledge into innovation.

Here's how we're making an impact:

- Guest lectures by industry experts
- Technical workshops and seminar
- Student project showcases
- Research and innovation highlights
- Department events and achievements
- Internship, competition, and career opportunities

Beyond the Classroom

In every workshop, project, and event, there is a story of learning and growth. This newsletter captures the moments that make our department more than just classrooms and labs.

Inside Our Department

More than just updates, this is a space to celebrate creativity, teamwork, and innovation. Every edition highlights the journey, efforts, and ideas that continue to shape our department.

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

Mr. Vipin Mishra-Sem V Career Opportunities after GATE

Cracking GATE is just the beginning — Mr. Vipin Mishra unpacked the wide spectrum of doors it opens, from PSU placements to premier research institutions. Students walked away with a sharper sense of direction and a roadmap worth following.

Mr. Sumedh Koulgud-Sem V Opportunities for Students & Faculty — Early-Stage Entrepreneurs

What does it take to turn a problem into a product? Mr. Sumedh Koulgud, an early-stage entrepreneur, gave students and faculty a candid look at the startup ecosystem and the unique leverage an engineering background brings to it.

Mukundan / Mr. Mohan Nimbalkar -Sem III, V, VI Refrigeration Cycles in HVAC

From the physics of phase change to real-world HVAC system design, this session brought thermodynamic theory to life in the most tangible way possible. A must-attend for anyone who has ever wondered how comfort is engineered.

Mr. Mohan Nimbalkar-Sem III Career Opportunities for Mechanical Engineers

Mechanical engineering opens more doors than most students realise — Mr. Mohan Nimbalkar laid out the landscape across core industries, emerging sectors, and roles that didn't exist a decade ago. A timely reality check and an exciting preview of what's ahead.

Ms. Vijayalakshmi Venugopalan-Sem V Higher Education after Engineering

MS, MBA, research — the paths after a B.E. are many, and the choices are rarely obvious. Ms. Vijayalakshmi Venugopalan helped students cut through the noise with honest guidance on applications, timelines, and what higher education truly offers a mechanical engineer.

SI NO	Name of the Course/Program	Date	Resource Person	Sem
1	Career Opportunities after GATE	22/8/2025	Mr Vipin Mishra	V
2	Opportunities for students and faculty- Early-stage entrepreneurs	11/8/2025	Mr. Sumedh Koulgud	V
3	Refrigeration cycles in HVAC	11/9/2025	Mukundan/Mr Mohan Nimbalkar	III,V ,VII
4	Career opportunities for mechanical engineers	15/9/2025	Mr Mohan Nimbalkar	III
5	Higher education after Engineering	9/10/2025	Ms. Vijayalakshmi Venugopalan	V

EVENT ORGANISED

Department of Mechanical Engineering, Global Academy of Technology (GAT), Rajarajeshwari Nagar, Bengaluru in association with The Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE), through its Students Activity Committee – South Zone, successfully organized "INNOVATE X – Green Innovation Project Exhibition" on 20th December 2025 at Global Academy of Technology (GAT), Rajarajeshwari Nagar, Bengaluru. The event aimed to promote sustainable engineering solutions and encourage innovation among engineering and architecture students. The exhibition witnessed enthusiastic participation from various colleges across south India. A total of 16 teams with participants from reputed institutions across Karnataka and Tamil Nadu participated.

The following students from Global Academy of Technology won the third prize for the project title 'Charge as You Go',Dhushyanth R(1GA23ME006), Jayalaxmi K(1GA23ME011), Pratham Jagpat(1GA23ME027), Shreyas. M H(1GA23ME033)

SI NO	**Name of the Professional Societies**	**Name of the Event**	**Date of Event (DD/MM/YYYY)**
1	Indian Society of Heating, Refrigerating & Air conditioning Engineers (ISHRAE)	InnovateX Green innovation Project Exhibition	20/12/2025

Installation of Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE) on 11th September 2025, aiming at enhancing industry-institute interaction and providing our students with-a platform for professional growth in the fields of HVAC&R and allied technologies. The Program included signing of MoU with ISHRAE chapter and distribution of ISHRAE membership certificates to student members of Global Academy of Technology.

WORKSHOP ORGANISED

Boot Camp program on Industrial Hydraulics & Pneumatics, organized by the Department of Mechanical Engineering, Global Academy of Technology (GAT), conducted jointly with ACS College of Engineering, Bangalore in association with FESTO India Pvt. Ltd. From 03-11-2025 to 07-11-2025. The program was coordinated by Mr. Poorna Chandra, Mr. Kiran R and Dr. Rajesh R under the guidance of Dr. Bharat V, HoD, Mechanical Engineering Department.

The program was designed to provide hands-on exposure and industry-oriented learning to students, focusing on the practical applications of hydraulic and pneumatic systems widely used in modern industries. The boot camp featured insightful sessions delivered by eminent professionals from leading organizations.

SI NO	Name of the Event	Date of Event (DD/MM/YYYY)
1	Boot camp on "Industrial Hydraulics & Pneumatics" in association with FESTO	03/11/2025 to 07/11/2025

LIST OF ACTIVE PROFESSIONAL SOCIETIES/BODIES/CHAPTERS/CLUBS:

SI NO	Name of the Professional Societies/Bodies, Chapters, Clubs
1	Indian Society of Heating, Refrigerating & Air conditioning Engineers (ISHRAE)
2	Bureau of Indian Standards (BIS)
3	Innovative Robotic Association - Dept Club(IRA)
4	FUMES - Forum of United Mechanical Engineering Students, GAT

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

Name of the institution/ industry/ corporate house	Year of signing MoU	Duration	List the actual activities under each MOU year wise
Wellmine LLP	2025	10-12-2025 to 12-10-2030	Internship to final year ME students
Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE)	2025	11-09-2025 to 11-09-2028	Installation of ISHRAE Student Chapter,Technical talks,Innovate X Green project Expo
Medini Technologies	2025	2-06-2025 to 06-02-2030	Autodesk AutoCAD Certification training
Micropore	2024	18-03-2025 to 18-03-2030	One student placed ,Guest talked on GD&T
Bharat Dome Innovations Pvt. Ltd.	2024	09-10-2024 to 09-10-2027	Internship to 13 students and 2 students are placed
Central Machine Tool Institute	2024	01-01-2025 to 31-12-2025	Support for Industrial visit
GAT – Toyota Centre of Excellence	2018	21-06-2018-Still active	Dismantle and Assemble of Automotive Engines

STUDENT SPORTS PARTICIPATION

Name of the student	USN	Name of the event	STATE/ DISTRICT LEVEL	Certificates
Likitha B	1GA23ME019	District Junior Weightlifting Championship	DISTRICT	1st place
Likitha B	1GA23ME019	District Senior Weightlifting Championship	DISTRICT	1st place
Nikitha C N	1GA23ME022	District Junior Weightlifting Championship	DISTRICT	3rd place
Nikitha C N	1GA23ME022	District Senior Weightlifting Championship	DISTRICT	3rd place
Nikitha C N	1GA23ME022	VTU Powerlifting Competition	STATE	1st place
Nikitha C N	1GA23ME022	VTU Weightlifting Competition	STATE	3rd place
Nikitha C N	1GA23ME022	VTU Wrestling Championship	STATE	2nd place
Nikitha C N	1GA23ME022	VTU Judo Championship	STATE	2nd place
Nikitha C N	1GA23ME022	Wrestling	NATIONAL	Participation
Nikitha CN	1GA23ME022	All India Inter University tournament of Wrestling women	NATIONAL	Participation

Kusuma B	1GA23ME017	VTU 2025 Championsip	STATE	2nd place
Kusuma B	1GA23ME017	2026 ALL INDIA inter university championship	NATIONAL	Participation
Nikitha C N	1GA23ME022	Vtu Bangalore South division Throwball women tournament 2025-26	STATE	Participation

STUDENTS PARTICIPATION IN COMPETITIONS

The Autodesk Design League held during the International-Level Annual Technical Symposium – Phase Shift 2025 at BMS College of Engineering on 19th and 20th September 2025 under the guidance of Mr. Maruthi G V. Students showcased exceptional abilities in 3D design modeling, problem-solving, creativity, and engineering presentation skills, competing against teams from various national and international institutions. Their outstanding performance resulted in the following achievements:

Name of the student	**USN**	**Name of the event**	**Venue of the event**	**Date of the event**	**Certificate**
Chandanaa M N	1GA23ME004	Autodesk Design League	BMS College of Engineering	19/09/2025 - 20/09/2025	3rd place
Pushya M S	1GA23ME029	Autodesk Design League	BMS College of Engineering	19/09/2025 - 20/09/2025	3rd place
S Prajeet Yadav	1GA23ME030	Autodesk Design League	BMS College of Engineering	19/09/2025 - 20/09/2025	1st place
Kashi Balaji M	1GA23ME411	Autodesk Design League	BMS College of Engineering	19/09/2025 - 20/09/2025	1st place

STUDENTS PARTICIPATION IN PROFESSIONAL EVENT

SI NO	Name of the student	Name of the Event	Date of Event (DD/MM/YYYY)	Name of Award
1	Sriranga..D	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
2	Nakul.N.Gowda	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
3	Balaji.V	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
4	Yashas.N	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
5	Janny Vasanth.M.S	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
6	Jeevith.V	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
7	Muzamil DilawarWagay	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
8	Himal Ragh	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented

9	A.E.Sumanth	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
10	Dinesh.R	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
11	Rekhashree.C	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
12	Prabhanjan.G. Shastri	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
13	Suhas.R	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
14	Vikas Das.V	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
15	Ranjith.B	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
16	Gagan.K	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
17	Purnavi.s	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented

18	G.P. Siddeshwar	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
19	Nikitha.C.N	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
20	Likitha.B	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
21	Prajwal Kumar.J	International conference on “Applied sciences and Advanced materials ICASAM-2025”	28/11/2025 to 29/11/2025	Paper Presented
22	Yashas.N	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
23	Janny Vasanth M S	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
24	Nakul N Gowda	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
25	RekhashreeC	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
26	Anantha Krishna P	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
27	Prajwal Kumar J	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
28	Janny Vasanth M.S	InnovateX-Green innovation Project Exhibition ,Ishrae	20/12/2025	Presented the Project
29	Janny Vasanth M.S	IIC Regional Meet, M.S.ramaiah university	12/2/2025	Participated

30	Janny Vasanth.M.S	National conference on “School wellness”	07/11/2025 to 08/11/2025	Participated
31	Prajwal Patil	AWS Cloud Assessment	8/6/2025	Certified
32	Janny Vasanth.M.S	Vehicle Dynamics Workshop	30/8/2025	Participated
33	Janny Vasanth.M.S	Startup Bootcamp for Early-stage Entrepreneurs	13/08/2025 to 14/08/2025	Participated
34	Suhas.R	Inter college Project Expo	11/8/2025	Participated
35	Sai Krishna M.S	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
36	K.Krishan	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
37	Eshwar chandra.M	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
38	Himal Ragh	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
39	Gagan.K	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
40	Chandu.B	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
41	Chandan.J.Ram	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
42	Pranav.S.Kabadi	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
43	Nikhil.M	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
44	S.Prajeeth Yadav	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
45	Nithin.K.B	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated

46	Nithin.K.B	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
47	Abdul Aziz	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated
48	Mehul Aarya.S	Indian Karting race 2025	30/10/2025 to 03/11/2025	Participated

STUDENT PROJECT EXPO

Student Name	Title	Venue	Date of the event
Yashas M	IDT Project Expo ,Title- A vibration resistant phone holder	Global Academy of Technology	8th Jan 2026
Pavana D G	IDT Project Expo ,Title- A vibration resistant phone holder	Global Academy of Technology	8th Jan 2026
Raghavendra S	IDT Project Expo ,Title- A vibration resistant phone holder	Global Academy of Technology	8th Jan 2026
Mohammed Saadataayan Shaik	IDT Project Expo ,Title- A vibration resistant phone holder	Global Academy of Technology	8th Jan 2026
Likitha B	Applied science and Adavance material ICASAM 2025 - Neuro gloves by voice control	BNMIT banglore	28th Nov 2025 to 29th Nov 2025
Nikitha C N	Applied science and Adavance material ICASAM 2025 - Neuro gloves by voice control	BNMIT banglore	28th Nov 2025 to 29th Nov 2025
G P Siddeshwar	Applied science and Adavance material ICASAM 2025 - Neuro gloves by voice control	BNMIT banglore	28th Nov 2025 to 29th Nov 2025
Gagan K	Applied science and Adavance material ICASAM 2025 - Neuro gloves by voice control	BNMIT banglore	28th Nov 2025 to 29th Nov 2025

DETAILS OF RESEARCH PAPERS PER TEACHER IN PEER REVIEWED JOURNALS DURING THE YEAR

SI NO	Name of the Author(s)	Title of the Paper	Name of the Journal	Year of publication	ISSN
1	Savitha.D.C	Thermal–Hydraulic Performance Analysis of Smooth and Corrugated Helical Coil Heat Exchangers Using Mathematical and Numerical Approaches	Journal of Computational Analysis and Applications(Q3)	29/8/2025	15211398
2	Dr.D.V.Ravi kumar	Sustainable Lubrication Solutions: Rheological and Tribological Analysis of ZDDP-Enhanced Castor and Cashew Nut Shell Oil Biogenic Greases	Johnson Matthey Technology Review(Q2)	11/8/2025	2056-5135
3	Dr.Piyush Kumar Soni	Exploring Microstructural and Mechanical Properties Enhancement of Hybrid Composites Face Sheets for Sandwich Panels	Journal of The Institution of Engineers (India): Series D(Q2)	18/9/2025	2250-2130
4	Dr.Piyush Kumar Soni	An analytical approach to study the mechanical and temperature resistance of Cr2C3 reinforced with cobalt-based advanced composite coatings on Inconel 713 substrate	Journal of Materials Science: Materials in Engineering(Q2)	30/10/2025	3004-8958
5	Dr.P.Senthil kumar	Examination of urea water solution spray characteristics in hot cross flow	Experimental Thermal and fluid science(Q1)	24/10/2025	111635
6	Dr.Piyush Kumar Soni	Influence of Cobalt content on the Mechanical and Erosion performance of HVOF sprayed Wc-Co coatings on Inconel 718 superalloy	Surface reviw and Letters(Q3)	25/10/2025	17936667
7	Dr,Chanakyan. C	Cable Stiffness Characterization for a single layered cable – sheave contact throughmathematical model	EPJ Web of Conferences(Scopus)	26/9/2025	2100-014X

8	Dr,Chanakyan.C	Synthesis of Biosilica from Tectonagrandis Leaves and It's Incorporation in Solanumprocumbens Stem Fiber–Reinforced Epoxy Composites	Silicon(Q2)	20/12/2025	18769918
9	Dr.Bharat.V, Dr.C.Chanakyan, Mr.G.V.Maruthi	Mechanical properties and characterization on enhanced Al-Mg alloy reinforced with Cr3C2 particulates in situ developed by ultra sonic assisted stir casting	Ceramics International(Q1)	29/11/2025	2728842
10	Dr,Chanakyan.C	Characterisation studies and mechanical properties on friction stir processed AZ31B with SiC and C nanoparticles to enhancing surface composites	Canadian Metallurgical Quarterly(Q2)	9/2/2026	0008-4433
11	Savitha D.C	Experimental investigation to evaluate the impact of dimensional parameters of elliptical configured coil condenser on the performance of a vapour compression refrigeration system	International journal of Air conditioning and refrigeration(Q3)	6/3/2026	20101325

FACULTY DEVELOPMENT PROGRAM ATTENDED BY FACULTIES

Sl. No	Name of Teacher who attended the programme	Title of the programme	Duration (from - to) (DD-MM-YYYY)
1	Dr.Bharat.V	Atal FDP on "Advanced Trends in Aerospace Engineering: Quality, Smart Materials, Sustainable Avionics, and Additive Manufacturing"	18-08-2025 to 23-08-2025
2	Dr.Bharat.V	International FDP on "Ethical Application of Aiin Higher Education for Teaching,Research and Administrative work"	08-09-2025 to 17-09-2025
3	Mr.R.Kiran	Atal FDP on "Advanced Trends in Aerospace Engineering: Quality, Smart Materials, Sustainable Avionics, and Additive Manufacturing"	18-08-2025 to 23-08-2025
4	Dr.Ravi Kumar.V	Atal FDP on "Advanced Trends in Aerospace Engineering: Quality, Smart Materials, Sustainable Avionics, and Additive Manufacturing"	18-08-2025 to 23-08-2025
5	Mr.Poornachandra	Atal FDP on "Advanced Trends in Aerospace Engineering: Quality, Smart Materials, Sustainable Avionics, and Additive Manufacturing"	18-08-2025 to 23-08-2025
6	Dr.Asha.P.B	Atal FDP on "Advanced Trends in Aerospace Engineering: Quality, Smart Materials, Sustainable Avionics, and Additive Manufacturing"	18-08-2025 to 23-08-2025
7	Dr. Ravi kumar D.V	Atal FDP on "Advanced Trends in Aerospace Engineering: Quality, Smart Materials, Sustainable Avionics, and Additive Manufacturing"	18-08-2025 to 23-08-2025
8	Dr.Shreekala.N	Atal FDP on "Advanced Trends in Aerospace Engineering: Quality, Smart Materials, Sustainable Avionics, and Additive Manufacturing"	18-08-2025 to 23-08-2025
9	Dr. Chanakyan C	FDP on “Next-Gen Mechanical Systems: Leveraging AI/ML for Energy Efficiency & Sustainability	18-08-2025 to 22-08-2025
10	Mr.Maruthi.G.V	FDP on "Additive manufacturing for sustainable Applications"	18-08-2025 to 22-08-2025
11	Mr.Maruthi.G.V	FDP on “Next-Gen Mechanical Systems: Leveraging AI/ML for Energy Efficiency & Sustainability	18-08-2025 to 22-08-2025
12	Mr.Maruthi.G.V	FDP on " Hydrogen Energy & Fuel cell "	01-09-2025 to 06-09-2025

TECHNICAL ARTICLES BY STUDENTS

TYPES OF GREASES IN MECHANICAL ENGINEERING A TECHNICAL OVERVIEW

BY: LIPI RAJKUMAR UPPIN
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DEPARTMENT : MECHANICAL ENGINEERING
COLLEGE : GLOBAL ACADEMY OF TECHNOLOGY

ABSTRACT

Grease is one of the most widely used lubricants in mechanical engineering, playing a critical role in reducing friction, preventing wear, and protecting components from corrosion and contamination. Unlike liquid oils, greases are semi-solid lubricants that stay in place even under vibration, making them ideal for bearings, gears, joints, and other mechanical assemblies. This article explores the composition of grease, the various types used across industries, their properties, selection criteria, and applications in modern engineering systems.

INTRODUCTION

Every time a machine moves — whether it is a simple door hinge or a massive industrial turbine — surfaces in contact experience friction. Left unmanaged, friction leads to heat, wear, and eventual mechanical failure. Lubrication is the engineering solution to this problem, and among all lubricants, grease occupies a uniquely important position. Grease has been used as a lubricant for thousands of years. Ancient Egyptians applied animal fats to chariot axles to reduce friction. Today, modern greases are sophisticated engineering materials formulated with precision chemistry to meet the demands of high-speed electric motors, extreme-temperature furnace bearings, underwater marine equipment, and food-grade processing machinery. Understanding the types of grease and their properties is essential for any engineer or maintenance professional, as selecting the wrong grease can be just as damaging as using no lubrication at all.

WHAT IS GREASE?

Grease is a lubricant consisting of three main components:

1. Base Oil (70–95%):

This is the actual lubricating agent — usually a mineral oil, synthetic oil, or a blend of both. The base oil does the fundamental work of reducing friction between moving surfaces.

2. Thickener (3–30%):

The thickener acts like a sponge, holding the base oil in a semi-solid structure. It gives grease its characteristic consistency — from soft butter-like textures to firm, almost solid forms. The type of thickener largely determines the grease's name and properties.

3. Additives (0–10%):

These are chemical agents added to enhance specific properties such as anti-corrosion, extreme pressure resistance, anti-oxidation, or water repellence. Grease consistency is measured on the NLGI (National Lubricating Grease Institute) scale, ranging from NLGI 000 (almost fluid) to NLGI 6 (very stiff). Most general-purpose greases fall between NLGI 1 and NLGI 3.

TYPES OF GREASES

1. Lithium Grease

Applications: Automotive wheel bearings, chassis components, electric motor bearings, industrial machinery, and power tools.
Advantages: Versatile, affordable, widely available, and offers good load-carrying capacity.
Limitations: Not compatible with all other grease types; mixing can cause breakdown of the thickener structure.

2. Lithium Complex Grease

Applications: High-temperature industrial bearings, steel mill equipment, automotive disc brake callipers, and heavy-duty applications.

Advantages: Superior high-temperature performance, excellent oxidation resistance, and better load capacity than standard lithium grease.

Limitations: Higher cost than standard lithium grease. An advanced version of lithium grease, lithium complex grease is made by reacting lithium hydroxide with a combination of fatty acids and a complexing agent. This produces a grease with a significantly higher dropping point, typically above 260°C.

3. Calcium Grease (Lime Grease)

Applications: Marine equipment, water pumps, agricultural machinery, construction equipment, and chassis lubrication in wet environments.

Advantages: Excellent water resistance, low cost, and good corrosion protection.

Limitations: Low temperature ceiling (up to 80°C); not suitable for high-speed or high-temperature applications. One of the oldest grease types, calcium grease uses calcium soap as its thickener. It has outstanding water resistance and performs well in wet and humid environments, relying on water to maintain its structure.

4. Calcium Complex Grease

Applications: Steel plant conveyor bearings, hot-press equipment, marine machinery, and applications needing both high-temperature and water-resistant performance.

Advantages: High temperature resistance (above 230°C dropping point), outstanding water resistance, and good mechanical stability.

Limitations: May not be compatible with all sealing materials. By using a complexing agent alongside calcium soap, manufacturers produce calcium complex grease with a much higher dropping point while retaining the exceptional water resistance of traditional calcium grease.

5. Sodium Grease

Applications: Electric motor bearings, industrial gearboxes in dry environments, and older automotive applications.

Advantages: Good high-temperature performance (up to about 150°C) and fibrous structure provides strong adhesion to metal surfaces.

Limitations: Poor water resistance — will emulsify in wet conditions and must be kept away from moisture. Sodium soap-thickened grease has a fibrous texture that provides strong adhesion to metal surfaces, making it suitable for applications in dry environments where water is not a concern.

6. Bentone (Clay) Grease

Applications: Oven conveyor bearings, kiln equipment, hot-section industrial machinery, and any application where a grease that will not melt is required.

Advantages: No conventional dropping point (will not melt), making it ideal for extremely high-temperature environments.

Limitations: Poor pumpability; not suitable for centralised lubrication systems; higher cost. Bentone grease uses organically modified clay (bentonite) as its thickener instead of a metallic soap. Because clay does not melt, bentone grease can operate continuously at temperatures up to 200°C and survive short excursions above 300°C.

7. Polyurea Grease

Applications: Electric motor bearings, automotive alternators, sealed bearings in HVAC systems, and precision instrument bearings.

Advantages: Very long service life, excellent oxidation and thermal stability, and low oil separation. **Limitations:** Generally not compatible with other grease types; must not be mixed with soap-thickened greases. Polyurea grease is thickened using a polymer-based compound rather than a metallic soap. It offers exceptional oxidation resistance and longevity, making it ideal for sealed-for-life bearings that cannot be relubricated during service.

8. PTFE (Teflon) Grease

Applications: Plastic and rubber components, threaded fasteners, valves, o-rings, door mechanisms, and precision instruments.

Advantages: Compatible with plastics and rubber, very low coefficient of friction, chemically inert, and wide temperature range.

Limitations: Lower load-carrying capacity compared to metal-soap greases. PTFE (polytetrafluoroethylene) grease incorporates fine PTFE particles as both a thickener and a lubricant additive. PTFE is chemically inert and has an extremely low coefficient of friction, making it safe for use with rubber and plastic components that conventional greases can damage.

9. Silicone Grease

Applications: Electrical connectors, rubber seals, brake callipers, medical devices, laboratory instruments, and food-contact applications.

Advantages: Extremely wide temperature range (−60°C to +200°C), chemically inert, excellent dielectric properties, and safe for rubber and plastics.

Limitations: Poor load-carrying capacity; not suitable for heavily loaded metal contacts. Silicone grease uses silicone oil as its base fluid rather than mineral or synthetic hydrocarbon oil. It is stable across an exceptionally wide temperature range, is chemically inert, and is compatible with rubber, plastics, and electronic components.

10. Food-Grade Grease

Applications: Conveyor bearings in food processing plants, meat-processing equipment, bakery machinery, and dairy processing lines.

Advantages: Safe for incidental food contact, meets regulatory requirements, and often NSF H1 certified.

Limitations: Higher cost; may not offer the same extreme-pressure performance as standard industrial greases. Food-grade greases are specifically formulated for use in food and beverage processing equipment where incidental contact with food products is possible. They use base oils and thickeners approved by regulatory bodies such as the US FDA (H1 classification).

IMPORTANCE OF GREASE COMPATIBILITY

A common mistake in maintenance practice is mixing greases of different thickener types. When incompatible greases are combined, the thickener structures can interact chemically, causing the grease to soften dramatically, lose its consistency, and leak from the bearing. This can result in rapid bearing failure. Industry best practice is always to purge old grease completely before introducing a different type, and to consult compatibility charts published by grease manufacturers.

CONCLUSION

Greases are far more than simply ‘thick oil.’ They are precisely engineered lubricants whose performance depends on the careful combination of base oil, thickener, and additives. From the lithium grease in a car’s wheel bearing to the food-grade grease in a dairy processing plant, each type is tailored to specific conditions of temperature, speed, load, and environment. For mechanical engineers, maintenance technicians, and students alike, understanding the distinctions between grease types is fundamental to ensuring machine reliability, extending equipment life, and avoiding costly failures. The right grease, applied correctly, is one of the simplest and most cost-effective investments in any mechanical system.

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CNC MACHINING EXPLAINED:
HOW COMPUTERS CUT METAL WITH PRECISION

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ABSTRACT

Computer Numerical Control (CNC) machining has fundamentally transformed the way metal components are designed and manufactured. By using pre-programmed computer software to control the movement of machine tools, CNC systems can produce highly complex, precise parts at speeds and tolerances that human operators alone could never achieve. From simple drilling operations to intricate five-axis milling of aerospace components, CNC machining has become the backbone of modern manufacturing. This article explores what CNC machining is, how it works, the types of CNC machines used in industry, the materials it processes, its wide-ranging applications, and the future trajectory of this indispensable technology.

WHAT IS CNC MACHINING?

CNC machining is a subtractive manufacturing process in which a computer-controlled machine tool removes material from a solid workpiece to produce a finished part. The term 'subtractive' distinguishes it from additive processes such as 3D printing, where material is deposited layer by layer. Instead, CNC machining starts with a block, rod, or sheet of raw material — typically metal, but also plastic, wood, foam, or composites — and selectively cuts away unwanted material until the desired geometry is achieved.

The 'computer numerical control' aspect refers to how the machine receives its instructions. A programmer or engineer creates a digital model of the desired part using Computer-Aided Design (CAD) software. This model is then processed by Computer-Aided Manufacturing (CAM) software, which generates a toolpath — a sequence of precise coordinates and cutting parameters — and translates it into a language the machine understands, known as G-code. The CNC controller reads this G-code and drives the machine's motors and actuators with extreme accuracy.

HOW CNC MACHINING WORKS

The CNC machining process follows a well-defined sequence of steps:

• CAD Design: An engineer creates a 3D digital model of the part using CAD software such as SolidWorks, AutoCAD, or CATIA, specifying every dimension, hole, slot, and surface.

• CAM Programming: CAM software converts the 3D model into a toolpath — a set of instructions telling the cutting tool exactly where to move, how fast, and how deep. The output is G-code.

• Machine Setup: An operator secures the raw workpiece in the machine's fixture or chuck, selects the appropriate cutting tools, loads the G-code into the CNC controller, and defines the work-coordinate origin.

• Machining: The CNC controller executes the G-code. Servo motors and ball-screw drives move the cutting tool or workpiece along programmed axes. Coolant is typically applied to remove heat and chips.

• Inspection and Finishing: Finished parts are measured using coordinate measuring machines (CMMs) or gauges to verify dimensional accuracy before any surface finishing, anodising, or coating is applied.

MATERIALS PROCESSED BY CNC MACHINING

One of the greatest strengths of CNC machining is its material versatility. Common metals include aluminium alloys (widely used for their light weight and machinability), steel and stainless steel
(for strength and corrosion resistance), titanium (for aerospace and biomedical applications demanding high strength-to-weight ratio), brass and copper (for electrical components and precision fittings), and nickel superalloys such as Inconel (for jet engine parts operating at extreme temperatures). Beyond metals, CNC machines routinely process engineering plastics, carbon fibre reinforced polymer composites, and even ceramics in specialised applications.

TYPES OF CNC MACHINES

Several distinct machine types are used in CNC machining, each suited to specific operations:

• CNC Milling Machine: A rotating multi-point cutting tool removes material from a stationary or slowly moving workpiece. Mills can operate on three to five axes simultaneously, enabling complex contoured surfaces.

• CNC Lathe / Turning Centre: The workpiece rotates at high speed while a single-point cutting tool moves linearly to produce cylindrical parts such as shafts, bolts, and bushings.

• CNC Drilling Machine: Specialised for producing accurate holes at precise locations and depths, often combined with milling capability in machining centres.

• CNC Grinding Machine: Uses an abrasive wheel to achieve very fine surface finishes and tight tolerances on hardened workpieces, common in bearing and tool manufacture.

• CNC Electrical Discharge Machine (EDM): Uses controlled electrical sparks to erode material from conductive workpieces, useful for creating intricate cavities in hardened steel moulds.

APPLICATIONS OF CNC MACHINING

• Aerospace: Structural frames, engine casings, turbine blades, and landing-gear components demand the exceptional accuracy and consistency that only CNC machining can deliver at production volumes.

• Automotive: Engine blocks, cylinder heads, crankshafts, transmission housings, and brake callipers are all CNC-machined to ensure reliable performance and interchangeability.

• Medical Devices: Surgical instruments, orthopaedic implants, and prosthetic joints require biocompatible materials machined to micrometre tolerances — a task uniquely suited to CNC technology.

ADVANTAGES OF CNC MACHINING

• Precision and Repeatability: CNC machines routinely hold tolerances of ±0.005 mm, reproducing identical parts across production runs of thousands of units.

• Speed and Efficiency: Automated tool changes, high spindle speeds, and continuous unmanned operation significantly reduce cycle times compared to manual machining.

• Flexibility: Changing from one part design to another requires only a new G-code program rather than physical retooling, making small-batch and prototype production economically viable.

• Safety: Automated operation reduces direct human involvement in hazardous cutting processes, lowering the risk of workplace injury.

CHALLENGES AND LIMITATIONS

Despite its many advantages, CNC machining presents certain challenges. The initial capital cost of high-end machining centres is substantial, often running into tens of millions of rupees for fiveaxis machines. Skilled CNC programmers and machinists are essential but increasingly difficult to find. The subtractive nature of the process generates material waste in the form of chips and swarf, which must be managed and recycled responsibly. Additionally, certain highly complex internal geometries — such as internal lattice structures — remain difficult or impossible to produce by machining alone and may require complementary additive manufacturing methods.

CONCLUSION

CNC machining stands as one of the most transformative technologies in the history of manufacturing. By placing the precision of computer control in the hands of machine tools, it has enabled engineers to realise designs of extraordinary complexity and accuracy at production scales previously unimaginable. From the turbine blades powering commercial aircraft to the implants restoring mobility to patients, CNC-machined components quietly underpin modern life.

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