

DEPARTMENT OF MECHANICAL ENGINEERING

**NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA,
SURATHKAL**

**Srinivasnagar, P.O. Mangaluru - 575025
Karnataka, India**



**Master of Technology
in
MANUFACTURING ENGINEERING**

MANUFACTURING ENGINEERING

The Master of Technology program in Manufacturing Engineering was started in 1989. The program emphasizes fundamental principles of Manufacturing Engineering for various applications, including Materials Processing, Friction Stir Welding, Semi-Solid Processing of Composites, Thermal Spray Coatings, Severe Plastic Deformation, Advanced Materials Characterization, Micro-Machining, Laser Additive Manufacturing, and Nonconventional machining, etc. Students are also encouraged to do their projects in industries, wherever there are chances of exposure to various avenues in Manufacturing Engineering. The program has traversed the path of knowledge dissemination and generation and delivered efficient Manufacturing Engineering postgraduates to the nation.

VISION AND MISSION STATEMENT OF THE DEPARTMENT

VISION

To create globally competent mechanical engineers capable of working in an interdisciplinary environment, contributing to society through innovation, entrepreneurship, and leadership

MISSION

- 1) Produce Mechanical Engineers with a strong theoretical and practical knowledge to contribute to society with high moral and ethical values
- 2) Nurture students with a global outlook for a sustainable future and sound health.
- 3) Enable to be productive members of interdisciplinary teams, capable of adapting to changing environments of engineering, technology, and society.
- 4) Inculcate critical and deep-thinking abilities among students and develop entrepreneurial skills, innovative ideas, and leadership qualities.
- 5) Create facilities for continued education, training, research, and consultancy

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO-1 Create globally competent manufacturing engineers with exposure to scientific and engineering aspects of product life cycle.

PEO-2 Enable graduates with strong fundamentals and usage of appropriate engineering tools.

PEO-3 Develop skills for integrated problem-solving, analysis and effective communication in a team-based environment

PEO-4 Create awareness of the societal impact and professional ethics

PROGRAM OUTCOMES (POs)

PO-1: An ability to independently carry out research/investigation and development work to solve practical problems.

PO-2: An ability to write and present a substantial technical report/document.

PO-3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

CURRENT RESEARCH AREAS

- Advance Manufacturing Processes
- Additive Manufacturing
- Post-Processing of Additively Manufactured Parts
- Coatings
- Composites/ Green Composite
- Micro/Nano Machining
- Advanced Welding
- Sustainable Manufacturing
- Repair and Remanufacturing
- Traditional & Nontraditional Machining
- Bio-fuels
- Tribology, Wear and Corrosion
- Cutting Fluids
- Biomedical Implants
- Microfluidics
- Computation Fluid Dynamics
- Surface Engineering
- Topology Optimization
- Condition Monitoring
- Precision Engineering

COURSE OF STUDY

The current course plan details are available on the institute website. The latest curriculum is available for M. Tech (Manufacturing) is

Semester	Code: Title	(L-T-P) Credit
FIRST	ME 700 Machining Processes	(3-0-0) 3
	ME 701 Computer Integrated Manufacturing	(3-0-0) 3
	ME 702 Metal Forming Processes	(3-0-0) 3
	ME 703 Manufacturing Systems Lab I	(0-0-2) 2
	ME 704 Metal Casting Processes	(3-0-0) 3
SECOND	ME 705 Micro Manufacturing	(3-0-0) 3
	ME 706 Additive Manufacturing	(3-0-0) 3
	ME 707 Manufacturing Systems Lab II	(0-0-2) 2
	ME 880 Seminar	2
THIRD	ME 881 Practical Training/ME896 Minor Project	2
	ME 882 Major Project	4
FOURTH	ME 883 Major Project	8
Program Electives		
	ME 800 Metal Joining Processes	
	ME 801 Surface Engineering	
	ME 802 Composite Mechanics and Processing	
	ME 803 Artificial Intelligence in Manufacturing	
	ME 804 Modeling and Simulation of Manufacturing Processes	
	ME 805 Lean Manufacturing	
	ME 806 Precision Manufacturing	
	ME 807 Fluid Power Automation	
	ME 808 Laser Processing of Materials	
	ME 809 Tool Engineering	

ME 810 Production Management ME 811 Destructive and Non-Destructive Evaluation ME 812 Near Net Shape Processes ME862 Virtual Instrumentation ME863 Design for Manufacturing ME865 Robotics: Mechanics and Control ME866 Optimization Techniques ME867 Product Design and Development ME870 Biomechanics and Materials ME872 Machine Tool Design MA702 Design and Analysis of Experiments
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FACULTY (MANUFACTURING ENGG.)

**Prasad Krishna (PhD-University of Michigan)
Professor (HAG), (On Deputation, Director NIT
Calicut)**

Research Interests: Fluid Power Control Systems, Processing of Advanced Materials and Light Alloys, Modelling and Simulation of Solidification Processes, Characterization of Interfacial Heat Transfer in Permanent Mold Casting Processes.
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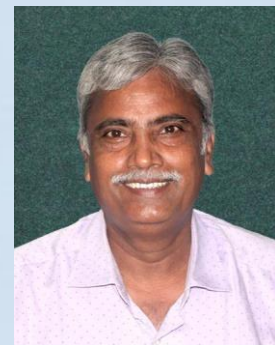


**Narendranath S. (PhD-IIT Kharagpur) (On
Deputation as Director, NERIST, Arunachal Pradesh)
Professor**

Research Interests: Casting, Machining, Advanced welding, and Materials

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**H. Shivananda Nayaka (PhD-IIT Roorkee)
Professor**

Research Interests: Advanced Manufacturing Engineering, Severe Plastic Deformation, Accumulative Roll Bonding, Magnesium alloys

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**Ramesh M.R. (PhD-IIT Roorkee)
Professor**

Research Interests: Thermal Spray Coatings, Severe Plastic Deformation, Advanced Materials Characterization, Bio Fuels, FEA, Wear, Erosion, Oxidation & Hot Corrosion, Welding.

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Srikanth Bontha (PhD-Wright State University)

Professor

Research Interests: Additive Manufacturing, Machinability of Titanium Alloys, Modelling of Manufacturing Processes

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Sudhakar C. Jambagi (PhD-IIT Kharagpur)

Associate Professor

Research Interests: Modern Manufacturing Processes
Thermally Sprayed Coatings, Green Composites

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Ranjeet Kumar Sahu (PhD-IIT Madras)

Assistant Professor

Research Interests: Micro/Nano Machining, Nano Materials Synthesis & Characterization, Precision Engineering, Additive Manufacturing, Advanced Welding

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A.S.S. Balan (PhD-IIT Madras)

Assistant Professor

Research Interests: Precision Machining, Repair and Remanufacturing, Surface Engineering, Additive Manufacturing, Condition Monitoring

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P.S. Suvin (PhD-IISc Bangalore)

Assistant Professor

Research Interests: Sustainable Manufacturing, Traditional and Non-Traditional Machining, Tribology, Green Lubricants-Synthesis and Testing of Eco-friendly cutting fluids.

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Neha Choudhary (PhD-IIT Roorkee)

Assistant Professor

Research Interests: Additive Manufacturing, Sustainability
Polymer Processing, Composites, Biomedical Implants, Multi
Criteria Decision Making Techniques, Hybrid Manufacturing,
Metamaterials

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Atul Singh Rajput (PhD-IIT Guwahati)

Assistant Professor

Research Interests: Additive Manufacturing, Post Processing
of Additively Manufactured Parts, Topology Optimization,
Biomedical Implants

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Pavan Pandit (PhD-IIT Madras)

Assistant Professor

Research Interests: Conventional and unconventional
machining, Micromachining, Biomedical devices,
Microfluidics, Computational Fluid Dynamics, Smart
Manufacturing

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COMPLETED R&D PROJECTS

1. Investigation of machining characteristics of NiTi-based shape memory alloys using WEDM: DST-SERB: - S. Narendranath
2. Study of corrosion behaviour of Wrought Mg Alloys processed by Severe Plastic Deformation for Naval Applications: NRB: - S. Narendranath
3. Experimental Technique to Induce Surface Grain Refinement Through Laser Shock Peening on ECAP Processed Mg Alloy, Funding Agency: SERB-DST, Investigator: Dr. H Shivananda Nayaka
4. Development of HVOF sprayed cermets coatings in improving resistance to hot corrosion and erosion of gas turbine alloys, Funding Agency: AICTE, Investigator: Dr. Ramesh M R, Dr. N D Prasanna
5. Improvement In the Properties of Thermally Sprayed Hydroxyapatite Bio-Ceramic Coating Reinforced with Nanostructured Materials, Funding Agency: DST-SERB, Investigator: Dr. Sudhakar C Jambagi
6. Additive Manufacturing of Large Size Metal Components with Wire & Powder Hybrid Direct Energy Deposition (WP-DED) Process, Funding Agency: SERB-CRG, Investigator from NITK: Dr. Srikanth Bontha

ONGOING R&D PROJECTS

Sl. No.	(Principal Investigator/ Coordinator)	Project Title	Grant (INR) Lakhs	Funding Agency
1.	Dr. A.S.S. Balan	Ultrafine Grain Refinement Through Low Plasticity Burnishing on WAAM of Mg alloy For Aerospace and Automotive Applications	16.01	SYST-SEED
2.	Dr. Ramesh M R, Dr. Ravikiran Kadoli and Dr. Sharnappa J	Combined HVOF-PVD technology in coating manufacturing alternate to hard chrome	12.51	DST-International Cooperation Division
3.	Dr. Srikanth Bontha	Laser-based Additive Manufacturing of Ni-based Superalloy Components: Advancing Repair and Enhancement Technologies Using LMD Technique - A Simulation and Experimental Validation	26.4	ISRO
4.	Dr. Srikanth Bontha, Dr. Sunil Chakrapani, Michigan State University, USA	Laser Additive Manufacturing of Novel and High-performance Ni-based Superalloy Composites	44.08	SPARC
5.	Dr. Ranjeet Kumar Sahu, Dr. Hemantha Kumar and Dr. Debashisha Jena	Synthesis of Intelligent Nanostructured Materials via a Plasma Source based Digital Nanomanufacturing: Method and their Characterization	30.27	DST-SERB
6.	Dr. P S Suvin, Dr. Nikhil and Dr. Arun D	Enhance lubricant performance in an electrical environment to overcome electrical bearing failures in EV	13.5	DST-SERB
7.	Dr. M. R. Ramesh and Dr. Sharnappa Joladarashi	Performance evaluation of HVAF sprayed NiAl intermetallic based composite coatings for aerospace repair and manufacturing applications	27	DST-SERB
8.	Dr. Srikanth Bontha and Dr. A.S.S. Balan	Laser Directed Energy Deposition of Functionally Graded Cu-SS316L structures for Power Generation applications	31.45	DST-SERB
9.	Dr. Srikanth Bontha and Dr. Rajasekaran B	Assessing suitable additive manufacturing technology for processing Titanium Aluminide components with desired microstructures and high temperature properties for aeroengine applications	338	DRDO
10.	Dr. A.S.S. Balan and Dr. Srikanth Bontha	Functionally Graded Cu-Cr-Zr / NiCrAlY / YSZ based thermal barrier coating using Laser Directed Energy Deposition for Rocket nozzle Applications	36.5	SERB-CRG
11.	Dr. P S Suvin	Enhance lubricant performance in an electrical environment to overcome bearing failures in electric vehicles	15.6	CRG-SERB
12.	Dr. M. R. Ramesh and Dr. Sharnappa Joladarashi	Performance evaluation of HVAF sprayed NiAl intermetallic based composite coatings for aerospace repair and manufacturing applications	30.2	CRG-SERB
13.	Dr. Atul Singh Rajput, Dr. Srikanth	Repairment of underwater parts with additive manufacturing	32	IITG TIH

Bontha and Dr. Sajan Kapil			
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PROMINENT PUBLICATIONS

Sl. No.	Title	Journal	Author(s)
1.	Laser directed energy deposited Ti-48Al-2Cr-2Nb alloy: An investigation of high temperature oxidation behavior	Materials Letters, 361, pp. 136078, 2024	Ravi C. Gurugubelli, Vamsi Krishna Balla, B. Rajasekaran, Prasad Krishna, Srikanth Bontha
2.	Copper-graphene nanocomposite fabrication through LP-DED process: Powder preparation, characterization and printability studies	Journal of Manufacturing Processes, 131, pp. 707-723, 2024	Subramanya Sharma, Raja S. Thanumoorthy, Srikanth Bontha, A.S.S. Balan
3.	Enhancing fatigue performance of AZ31 magnesium alloy components fabricated by cold metal transfer-based wire arc directed energy deposition through LPB	Journal of Magnesium and Alloys, 12(4), pp. 1638-1662, 2024	S.K. Manjhi, Srikanth Bontha, ASS Balan
4.	Enhancing the tribological performance of PEG 200 using oil-miscible deep eutectic solvents as lubricant additives	Tribology International, 212, pp.110957, 2024	B.D.K. Patro, P.S. Suvin,
5.	Tool health monitoring in lathe turning process by artificial intelligence techniques—a review	Concurrent Engineering, 33, pp. 212-235, 2025	CG Gavina, KL Hemalatha, KJ Ranganath, S Rajanna, H Shivananda Nayaka
6.	Enhancing mechanical properties of Ti-64 alloy through ECAE: lubricant optimization, microstructural evolution and optimal process parameters	International Journal on Interactive Design and Manufacturing, 19 (4), pp.2521-2538, 2025	M. Rajesh Castelino, N Mallikappa, Shashikantha Karinka, Vijeesh Vijayan, H Shivananda Nayaka, James Valder
7.	Establishing high temperature tribological performance and wear mechanism map of engineered in-situ TiB ₂ reinforced Mg-RE metal matrix composites	Tribology International, 201, pp.110189, 2025	S.K. Sahoo, M.R. Ramesh, S.K. Panigrahi
8.	Studies on high temperature erosion behavior of HVOF-sprayed (Cr ₃ C ₂ -NiCr)Si and WC-Co/NiCrAlY composite coatings	International Journal of Refractory Metals and Hard Materials, 127, pp.106970, 2025	Subbarao Medabalimi, Ajit M. Hebbale, Suresh Gudala, Uzwalkiran Rokkala, M.R. Ramesh
9.	Numerical and Experimental Investigation of Thermal Barrier Effects of CNT-Reinforced Fly Ash/Alumina Coatings in Diesel Engine Pistons	ACS Applied Materials & Interfaces, 17(26), pp.38411-38426, 2025	Nagarjuna Chavana, Biswaraj Sarkar, Sudhakar C. Jambagi

10.	Tribological and Microstructural Evaluation of HVOF-Sprayed Hydroxyapatite Coatings with Machine Learning-Based Wear Rate Prediction	Tribology International, 213, pp.111038, 2025	N. Jagadeeshanayaka, Manmohan Singh Negi, Sudhakar C. Jambagi
11.	Optimization of measured mechanical characteristics of selective microwave hybrid heating processed Inconel 625/ SS 304 weldments using multi-objective JAYA algorithm coupled with multi-attributes decision making R-method	Measurement, 240, pp.115553, 2025	Bidesh Singha, D. L. Kamble, Ranjeet Kumar Sahu, Narendranath S, Ravindra. I Badiger
12.	In-situ Development of Nano MoS ₂ Particles Infused Micro-textured Tungsten Carbide Surfaces using Spark Ablation Technique Coupled with Inhouse Fabricated Ultrathin Electrodes for Enhancing Tribological Performance	Journal of Manufacturing Processes,161(15), 2026, pp. 386–403, 2025	T. S. Sahu, Ranjeet Kumar Sahu, Prasad Krishna
13.	Investigation on high-temperature tribological performance of laser directed energy deposited Inconel 625 for aerospace applications.	Tribology International, 202, pp.110388, 2025	Amit K. Praharaj, Srikanth Bontha, Vamsi K. Balla, Sunil K. Chakrapani, P.S. Suvin
14.	Design and development of an experimental setup for nanofinishing of exhaust valves using magnetorheological finishing to enhance functional performance	International Journal on Interactive Design and Manufacturing, 20, pp.971-986, 2025	K. Sharma, VK Singh, AS Rajput, M Das
15.	Hybrid wire arc directed energy deposition and machining approach for realizing density-based functionally graded materials with enhanced strength-to-weight ratios	CIRP Journal of Manufacturing Science and Technology, 61, pp.139-152, 2025	Ritam Sarma, Atul Singh Rajput, Sajjan Kapil, S. N. Joshi
16.	Evaluation of Machining Performance of Indigenously Developed Coconut Oil-Based Green-Cutting Fluid Under Minimum Quantity Lubrication Conditions	Journal of Tribology, 148(1), pp.014206, 2026	N. Venkata Sunil Kumar, P. S. Suvin, K. Vipin das
17.	Experimental and numerical investigation of the performance of luffa fiber-reinforced natural rubber composites with process parameter optimization using DOE	Fibers and Polymers Volume 26(12), pp. 5737-5757, 2026	Ashish Kumar Gurjar, SM Kulkarni, Sharnappa Joladarashi, Saleemsab Doddamani

BOOKS PUBLISHED

Sl. No.	Title	Journal	Author(s)
1.	Corona Discharge Micromachining for the Synthesis of Nanoparticles: Characterization and Applications	1 st Edition, Print ISBN - 9780367224738; eBook ISBN - 9781000065404, DOI: 10.1201/9780429275036, CRC Press, Taylor & Francis, Boca Raton, New York, 2019.	R.K Sahu, Somashekhar S. Hiremath
2.	Modern Manufacturing Technology: Spotlight on Future	1 st Edition, Print ISBN - 9781032066394; DOI:10.1201/9781032066394, CRC Press, Taylor & Francis, Boca Raton, New York, 2021.	Katiyar J.K, R.K. Sahu
3.	Advanced Manufacturing Processes	Print ISBN: 978-93-6027-813-7, All India Council for Technical Education (AICTE) – Government of India, New Delhi, India, March 2025	Ranjeet Kumar Sahu and Devendra Laxman Kamble

PATENTS PUBLISHED

Sl. No.	Title	Issue Date	Author(s)
1.	Double-Sided Ball End Mill Cutting Insert and Tool.	US 2010/0124465 A1, Awarded, May 20, 2010	Morrison, G.M., and Bontha, S
2.	Cutting Tool Having Coolant Delivery System for Providing Cutting Fluid in a Fan-Like Pattern	US 2010/0239377, Awarded, September 23, 2010	Morrison, G.M., and Bontha, S
3.	Cutting Tool with Error Proofing Feature	US 2011/0076106 A1, Awarded, March 31, 2011	Morrison, G.M., Bontha, S., Seculi, J., Long, T.J., Verellen, J.J., and Iyer, R
4.	Method for Generation of Nanoparticles using Advanced Mechanical Micro-Machining Technique	4294/CHE/2014, Awarded on September 29, 2020.	Ranjeet Kumar Sahu, Somashekhar S. Hiremath
5.	Method And System for Fabricating a Metallic Continuous Reinforced Composite	468811, Awarded, November 14, 2023	Praveen T R, and H Shivananda Nayaka
6.	Drill bit for drilling polymer matrix materials	523382, Granted on, March 11, 2024	ASS Balan
7.	Multi Degree of Freedom Bipedal Bot System	535363, Granted on, April 26, 2024	Shabarish P. Pillai, Anand R. John, Yash Jamkhedkar, Sachet Rao and Ranjeet Kumar Sahu

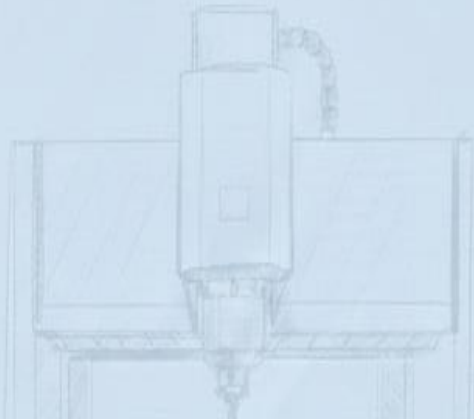
8.	Fly ash-based composite composition for thermal insulation and method for preparing the fly ash-based composite composition	560456, Granted on, February 17, 2025	Nagrajuna Chavana, Sudhakar C. Jambagi
9.	Hydroxyapatite-based Composite for Coating Implants and Method thereof	567780, Granted on, June 24, 2025	Deep Shankar, Sudhakar C Jambagi
10.	A Single-step Method for Production of Magnetorheological (MR) Fluid using Spark Discharge Technique	16863, Published on September 01, 2023, FER submitted on January 21, 2025	Pinjala Devikiran, Puneet N P, Tak Radhe Shyam Saini, Ranjeet Kumar Sahu and Hemantha Kumar
11.	A Self-Lubricating Hybrid Reinforced Aluminium Metal Matrix Composite (AMMC)	123076, Published on, December 19, 2025	Santosh Amarapure, Ranjeet Kumar Sahu, N. Narendra Babu and Sumanth Govindarajan

CONSULTANCY POTENTIAL

- Analysis of Machining Processes (turning, milling, grinding, and other Non-traditional Machining processes)
- Solidification Processing
- Metal Additive Manufacturing
- Computer-Aided Modelling and Analysis
- Surface Metrology and Instrumentation
- Error compensation of CNC Machines
- Micro Manufacturing
- Wear and Tribological Studies
- Repair, Re-manufacturing, and Surface modification

MAJOR FACILITIES	MAJOR LABORATORIES
<ul style="list-style-type: none"> ❖ 25-ton Hydraulic Press ❖ CAD Lab ❖ Software: AUTOCAD, ANSYS, ADAMS, DEFORM, EES, NIST-REFPROP, SIMPACK ❖ Injection Molding Equipment ❖ Pin on Disc wear testing Machine ❖ Universal Testing Machine ❖ Vickers Microhardness Tester 	<ul style="list-style-type: none"> ❖ Machine shop I & II ❖ CAD/CAM laboratory ❖ CNC Machine Tools Laboratory ❖ Materials characterization laboratory ❖ Metrology Laboratory

- ❖ Vacuum Arc Melting Furnace
- ❖ Wire-Electric Discharge Machine
- ❖ Microwave Welding Furnace
- ❖ Rolling Machine
- ❖ Electro Chemical Corrosion Setup
- ❖ Optical Microscope
- ❖ Muffle Furnace
- ❖ Laser Shock Peening
- ❖ Ball Burnishing



Wire EDM



Microwave Furnace



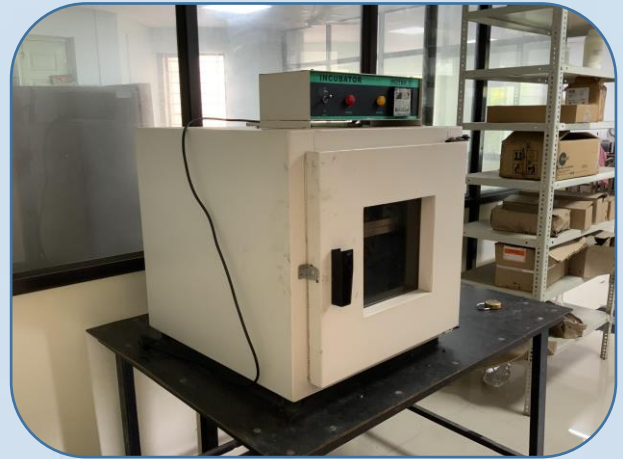
Universal Testing Machine



CNC Milling



CNC Turning



Furnace



Optical Microscope



Vacuum Arc Melting



Capstan Lathe



Milling



Contact:

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