VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

School of Mechanical Engineering

Department of Manufacturing Engineering

MACHINE SHOP

Machine Shop is a place where students acquire knowledge on the operation of various processes involved in manufacturing and production. The Manufacturing Processes and Machining Process and Metrology courses makes students competent in handling practical work in engineering environment.

- Mechanical Engineering Workshop is also involved in different maintenance/repair works for University.
- Central fabrication facility is a place where students acquire knowledge on the operation of various processes involved in manufacturing and production. The Manufacturing Processes and Machining Process and Metrology courses makes students competent in handling practical work in engineering environment.
- Mechanical Engineering Workshop is also involved in different maintenance/repair works for University

Lab In-Charge : Prof. RAJYALAKSHMI.G

Faculty associated with the lab

Name of the Faculty	Photo	Area of Expertise
Prof. Anthony Xavior. M		Manufacturing Process, Metal cutting, Powder Metallurgy
Prof. Kuppan. P		Advanced Machining Process, Laser processing of materials
Dr.Jeevanantham A.K.		Workability, Densification and Strain-hardening behavior of sintered Powder Metallurgy compacts. Two-dimensional and Three-dimensional tolerance analysis models for high precision assemblies.
Prof. Pandivelan.C		Metal forming , Incremental forming
Prof. Venkateswarlu. B		Engineering Metrology and Precision Engineering, Advanced Manufacturing, Non-Conventional Machining
Prof. Ramanujam.R		Machining Process, Additive Manufacturing

Prof. Sampath Kumar.T		**Metal Cutting, Micro machining, Composite machining, Additive manufacturing**
Prof. Muralidharan.B		**Advanced Machining, Micro and nano Machining**
Dr.Chinmaya Prasad Mohanty		**Cryogenic Machining,Optimization Techniques, Composite materials, solar energy**
Prof. Anoj Giri		Residual stress measurement, FEM analysis, Material joining, Arc welding
Prof. Jeyapandiarajan		**Welding, Metallurgy, Corrosion Engineering**
Prof. Joel.J		**Manufacturing, Metallurgy, Foundry**
Prof. Sri Nagalakshmi Nammi		**Laser Machining**

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Staff In-Charge: **Mr. Mohan. S**		

EQUIPMENT

- **Lathe Machine**
- **Milling Machine**
- **Surface Grinding Machine**
- **Drilling Machine**
- **Radial Drilling Machine**
- **Tool and Cutter Grinder**
- **Bench Grinder**
- **Shaper**
- **Slotting Machine**
- **Angle Cutter**

School of Mechanical Engineering
Department of Manufacturing Engineering

MACHINE SHOP
MAJOR FACILITIES AVAILABLE

List of Equipment / Instrument /Software Tools (Whichever applicable)

Name of the Equipment	Number	Make and Model	Cost (Lakhs Rs.)
M.K.make All Geared Lathe – Enterprise 1330	1 No	Batliboi & Co, Madras	1.3585638
Batliboi-Shaping Machine Model: BSH 63	2 No	Batliboi & Co, Madras	1.62510
M.K.make Power Hacksaw Machine Model: Cobra 9	1 No	Batliboi & Co, Madras	0.227026
Batlibio FA3U Universal Milling M/c	1 No	Batliboi & Co, Madras	2.73120
HMC/SURAJ Geared Head Universal Milling Machine	1 No	HMC- Bangalore SM-2	1.21100
AVRO- Surface Grinder	1 No	Shenoy &Co. Madras	0.334522
SAGAR-Heavy duty Belt driven Planning Machine	1 No	Shenoy &Co. Madras	1.43488
Batliboi – Pedestal Grinder Model – DD16	1 No	Batliboi & Co, Madras	1.131350
EIFCO-Bench Grinder	1 No	Batliboi & Co,	0.02208.00
Turnmaster-35 All Geared Head Lathe	7 No.'s	MKL-Hubli Karnataka	1.2021350
Turnmaster-40 All Geared Head Lathe	1 No	MKL-Hubli Karnataka	1.9989420
EIFCO make Gear Hobber	1 No	United Engg. Works Chennai	8.76720
Eifco – Slotting Machine	1 No	Eifco Sales agencies-Coimbatore	0.99648
Eifco – Slotting Machine	1 No	Eifco Sales agencies-Coimbatore	1.54380
EIFCO Radial Drilling Machine Model: RDH 325	1 No	Eifco Sales agencies-Coimbatore	0.51503
Tool and Cutter Grinder	1 No	HMC-Banglore	0.61145
Tool and Cutter Grinder (SG3)	1 No	Batliboi & Co, Madras	3.37760

Lathe tool Dynamometer (6210)	**2 No**	**IEI-Bangalore**	**0.95413**
Hydraulic Surface Grinding Machine	**1 No**	**PRAGA Tools LTD Secandrabad**	**4.64306**
Vertical Ram Turret Milling machine	**1 No**	**S&T Engg. Coimbatore**	**4.32037**
Batliboi make Radial Drilling Machine (BR-515)	**1 No**	**Batliboi & Co, Surat**	**5.92310**
Syscon Lathe Tool Dynamometer	**1 No**	**Syscon Bangalore**	**1.41411**
Banka Lathe	**2 No**	**S&T Engg. Coimbatore**	**3.81000**
Geede Lathe	**2 No**	**GEDEE WEILER**	**11.09010**
Small Angle Grinder	**1 No**	**HMS-vellore**	**0.04870**
CNC Advanced Micro Machining Station	**1 No**	**INTERFACE, PUNE**	**1506750**
CNC Milling machine	**1 No**	**INTERFACE, PUNE**	**737500**

School of Mechanical Engineering

Department of Manufacturing Engineering

MACHINE SHOP
MAJOR FACILITIES AVAILABLE

TOOL AND CUTTER GRINDER

GEAR HOBBING MACHINE

SLOTTING MACHINE

RADIAL DRILLING MACHINE

DRILLING MACHINE

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Department of Manufacturing Engineering

MACHINE SHOP

List of Publications - AY 2012-2020

YEAR: 2012

- Kuppan, P., Narayanan, S., & Rajadurai, A. (2012). Experimental investigations into electrical discharge deep hole drilling of Inconel 718 using copper-tungsten electrode. International Journal of Mechatronics and Manufacturing Systems, 5(5-6), 399-418.
- Baskar, A., & Xavior, M. A. (2012). A new Heuristic algorithm using Pascal's triangle to determine more than one sequence having optimal/near optimal make span in flow shop scheduling problems. International Journal of Computer Application, 39(5), 9-15.
- Xavior, A. M., & Anouncia, M. S. (2012). Case-based reasoning (CBR) model for hard machining process. The International Journal of Advanced Manufacturing Technology, 1-7.
- Baskar, A., & Anthony Xavior, M. (2012). Effects of dummy machines on make span in a few classical heuristics using Taillard bench mark problems. International Journal of Materials and Product Technology, 45(1-4), 145-162.
- Vinayagamoorthy, R., & Xavior, M. A. (2012). Surface integrity of Ti-6Al-4V precision machining using coated carbide tools under dry cutting condition. In Emerging Trends in Science, Engineering and Technology (pp. 317-324). Springer, India.
- Pugazhenthi, R., & Xavior, M. A. (2012). A Heuristic toward Minimizing Waiting Time of Critical Jobs in a Flow Shop. In Emerging Trends in Science, Engineering and Technology (pp. 343-350). Springer, India.

YEAR: 2013

- Murickan, R. T., Jakkamputi, L. P., & Kuppan, P. (2013). Experimental investigation of dry electrical discharge machining on SS 316L. Int. J. Latest Trends in Eng. and Tech, 2(3).
- Syed, K. H., & Kuppan, P. (2013). Studies on recast-layer in EDM using aluminium powder mixed distilled water dielectric fluid. International Journal of Engineering and Technology, 5, 1775-1780.
- Rajyalakshmi G, PVRamaiah, Document Optimization of process parameters of wire electrical discharge machining on Inconel825 using grey relational analysis coupled with principle component analysis", ISSN:09734562, International Journal of Applied Engineering Research, 2013, Paper No: , Vol: 8, Issue No:11, Pg No:1293-1313
- Rajyalakshi G, PVRamaiah, Multiple process parameter optimization of wire electrical discharge machining on Inconel 825 using Taguchi grey relational analysis", ISSN:02683768, International

Journal of Advanced Manufacturing Technology, 2013, Paper No: 1249, Vol: 69, Issue No:5, Pg No:1249-1262, DOI No:10.1007/s00170-013-5081

- Vinayagamoorthy, R., & Xavior, M. A. (2013). Evaluation of Surface Roughness and Cutting Forces During Precision Turning. In Advanced Materials Research (Vol. 622, pp. 390-393). Trans Tech Publications.
- Baskar, A., & Anthony, X. M. (2013). Optimization of total material processing time in a manufacturing flow shop environment. In Advanced Materials Research (Vol. 622, pp. 136-141). Trans Tech Publications.
- Baskar, A., & Xavior, A. M. (2013). Solving Permutation Flow Shop Scheduling Problems with Job Idle Time in between Two Machines. In Key Engineering Materials (Vol. 531, pp. 699-702). Trans Tech Publications.
- George, T. T., Venugopal, J., Xavior, M. A., & Vinayagamoorthy, R. (2013). Investigation on Precision Turning of Titanium Alloys. In Advanced Materials Research (Vol. 622, pp. 399-403). Trans Tech Publications.
- Umasankar, V., Karthikeyan, S., & Xavior, M. A. (2013). Enhancing The Interphase Strength Of Aluminium Composite By Autocatalytic Process. International Journal of ChemTech Research, 5(5), 2165-2172.

YEAR: 2014

- Pandivelan, C., and A. K. Jeevanantham. "Formability Evaluation of AA 6061 Alloy Sheets on Single Point Incremental Forming using CNC Vertical Milling Machine." 2028-2508(2014)
- Venkatesan, K., Ramanujam, R., & Kuppan, P. (2014). Analysis of cutting forces and temperature in laser assisted machining of Inconel 718 using Taguchi method. Procedia Engineering, 97, 1637-1646.
- Venkatesan, K., Ramanujam, R., & Kuppan, P. (2014). Laser assisted machining of difficult to cut materials: research opportunities and future directions-a comprehensive review. Procedia Engineering, 97, 1626-1636.
- Kannan, M. V., Kuppan, P., Kumar, A. S., Kumar, K. R., & Jegaraj, J. J. R. (2014). Effect of laser scan speed on surface temperature, cutting forces and tool wear during laser assisted machining of alumina. Procedia Engineering, 97, 1647-1656.
- Kanish, T. C., Kuppan, P., Narayanan, S., & Ashok, S. D. (2014). A Fuzzy Logic based Model to predict the improvement in surface roughness in Magnetic Field Assisted Abrasive Finishing. Procedia Engineering, 97, 1948-1956.
- Joshi, A., Kansara, N., Das, S., Kuppan, P., & Venkatesan, K. (2014). A study of temperature distribution for laser assisted machining of Ti-6Al-4V alloy. Procedia Engineering, 97, 1466-1473.
- Xavierarockiaraj, S., & Kuppan, P. (2014). Investigation of cutting forces, surface roughness and tool wear during laser assisted machining of SKD11Tool steel. Procedia Engineering, 97, 1657-1666.
- Kanish, T. C., Kuppan, P., & Narayanan, S. (2014). Investigation of Surface Texture Generated by Magnetic Field Assisted Abrasive Finishing. Int J ChemTech Res, 6(3), 1725-1728.

- James, S. J., Venkatesan, K., Kuppan, P., & Ramanujam, R. (2014). Comparative study of composites reinforced with SiC and TiB2. Procedia Engineering, 97, 1012-1017.
- Kumar, H. P., & Xavior, M. A. (2014). Graphene reinforced metal matrix composite (GRMMC): a review. Procedia Engineering, 97, 1033-1040.
- Umasankar, V., Xavior, M. A., & Karthikeyan, S. (2014). Experimental evaluation of the influence of processing parameters on the mechanical properties of SiC particle reinforced AA6061 aluminium alloy matrix composite by powder processing. Journal of Alloys and Compounds, 582, 380-386.
- Ashwath, P., & Xavior, M. A. (2014). The effect of ball milling & reinforcement percentage on sintered samples of aluminium alloy metal matrix composites. Procedia Engineering, 97, 1027-1032.
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- Umasankar, V., Karthikeyan, S., & Xavior, M. A. (2014). The influence of electroless nickel coated SiC on the interface strength and microhardness of aluminium composites. Journal Material Environment Science, 5(1), 153-8.
- Venkatesan, S., & Xavior, M. A. (2014). A Study On Aluminum Matrix And Various Reinforcements Of Composites Processed By Stir Casting Method. International Journal of Scientific Research and Engineering Studies (IJSRES) Volume, 1.
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- Pugazhenthi, R., & Xavior, M. A. (2014). A characteristic study of exponential distribution technique in a flowshop using taillard benchmark problems. Pak Acad Sci, 51, 187-192.
- Xavior, M. A., & Vinayagamoorthy, R. (2014). Fuzzy Inference System for Prediction During Precision Turning Of Ti-6al-4v. Procedia Engineering, 97, 308-319.
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YEAR: 2015

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- Rajyalakshmi G, PVRamaiah, Application of Taguchi Fuzzy-Grey Relational Analysis for Process Parameters Optimization of WEDM on Inconel-825", ISSN:09746846, Indian Journal of Science and Technology, 2015, Paper No: , Vol: 8, Issue No:35, Pg No:-, DOI No:0.17485/ijst/2015/v8i35/50946

YEAR: 2016

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- Pugazhenthi, R., Xavior, M. A., & Saravanan, R. (2016). A case study on effect of grouping technique in a multi-stage hybrid flow shop. International Journal of Computing Science and Mathematics, 7(1), 42-53.
- Kumar, H. P., & Xavior, M. A. (2016). Fatigue and wear behavior of Al6061–graphene composites synthesized by powder metallurgy. Transactions of the Indian Institute of Metals, 69(2), 415-419.

- Ashwath, P., & Xavior, M. A. (2016). Effect of ceramic reinforcements on microwave sintered metal matrix composites. Materials and Manufacturing Processes, 1-6.
- Ashwath, P., & Xavior, M. A. (2016). Processing methods and property evaluation of Al2O3 and SiC reinforced metal matrix composites based on aluminium 2xxx alloys. Journal of Materials Research, 31(9), 1201-1219.
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- Rajyalakshmi G, Rajyalakshmi G, Modeling and multi-objective optimization of WEDM of commercially monel super alloy considering multiple users preferences", ISSN:09751459, Source of the Document Journal of Pharmaceutical Sciences and Research, 2016, Paper No: , Vol: 8, Issue No:8, Pg No:902-908

YEAR: 2017

- Baruah, A., Pandivelan, C., Jeevanantham, A. K., & Das, S. (2017). Optimisation and formability study of AA5052 through incremental sheet forming. International Journal of Computer Aided Engineering and Technology, 9(2), 124-144.
- Baruah, A., Pandivelan, C., & Jeevanantham, A. K. (2017). Optimization of AA5052 in incremental sheet forming using grey relational analysis. Measurement, 106, 95-100.
- Sreekar Reddy, Rajyalakshmi G, VK MANUPATI, Document An effective hybrid multi objective evolutionary algorithm for solving real time event in flexible job shop scheduling problem", ISSN:02632241, Measurement Journal of the International Measurement Confederation, 2018, Paper No: , Vol: 114, Issue No:, Pg No:78-90, DOI No:10.1016/j.measurement.2017.09.022
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- Ranjith Kumar g, Rajyalakshmi G, V KManupati, Document Surface micro patterning of aluminium reinforced composite through laser peening", ISSN:21561680, Source of the Document International Journal of Manufacturing Materials and Mechanical Engineering, 2017, Paper No: , Vol: 7, Issue No:4, Pg No:15-27, DOI No:10.4018/IJMMME.2017100102
- Manupati V K, Manupati V K, Rajyalakshmi G, A hybrid multi-objective evolutionary algorithm approach for handling sequence- and machine dependent set up times in unrelated parallel machine scheduling problem", ISSN:02562499, Source of the Document Sadhana Academy Proceedings in Engineering Sciences, 2017, Paper No: , Vol: 42, Issue No:3, Pg No:391-403, DOI No:10.1007/s12046-017-0611-2
- Rajyalakshmi G, Lalith Chaithanya, Mahesh Senapathi, Sasikanth T, Analysis of mechanical properties of AMMC during WEDM process", ISSN:1849544, Journal Applied sciences and Research, 2015, Paper No: , Vol: 11, Issue No:14, Pg No:121-126

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- Rajyalakshmi G, Yeswanth kumar A, Adithya Kumar, Optimization of friction stir welding process", ISSN:22774106, International journal of current engineering technology, 2014, Paper No: , Vol: 4, Issue No:, Pg No:4144-4152

YEAR: 2018

- Pandivelan, C., Jeevanantham, A. K., & Sathiyanarayanan, C. (2018). Optimization study on incremental forming of sheet metal AA5052 for variable wall angle using CNC milling machine. Materials Today: Proceedings, 5(5), 12832-12836.
- Sivakiran, G., Gangwal, Y., Venkatachalam, G., Pandivelan, C., & Ayyappan, S. (2018). Investigations on machining of banana fibre reinforced hybrid polymer matrix composite materials. Materials Today: Proceedings, 5(2), 7908-7914.
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YEAR 2019

- Vignesh, G., Pandivelan, C., & Narayanan, C. S. (2019). Study on formability and dislocation density in forming of hemispherical cup. Materials Today: Proceedings.
- Muralidharan, B., Chelladurai, H., & Kanmani Subbu, S. (2019). Investigation of magnetic field and shielding gas in electro-discharge deposition process. Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science, 233(11), 3701-3716.
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- Yelamasetti, B., & Rajyalakshmi, G. (2019). Effect of TIG, pulsed TIG and Interpulse TIG welding techniques on weld strength of dissimilar joints between Monel 400 and AISI 316. Materials Today: Proceedings.
- Kumar, G. R., & Rajyalakshmi, G. (2019). Role of nano second laser wavelength embedded recast layer and residual stress on electrochemical corrosion of titanium alloy. Materials Research Express, 6(8), 086583.

YEAR 2020

- Yelamasetti, B., Rajyalakshmi, G., & Vemanaboina, H. (2020). Comparison of metallurgical and mechanical properties of dissimilar joint of AISI 316 and Monel 400 developed by pulsed and constant current gas tungsten arc welding processes. The International Journal of Advanced Manufacturing Technology, 1-12.
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- Kannan, C., Ramanujam, R., & Balan, A. S. S. (2020). Mathematical modeling and optimization of tribological behaviour of Al 7075 based hybrid nanocomposites. Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology, 1350650120965781.

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School of Mechanical Engineering

Department of Manufacturing Engineering

CENTRAL WORKSHOP- MACHINE SHOP

GENERAL INSTRUCTIONS TO THE STUDENTS

- Uniform and Shoes are compulsory during the lab sessions
- Use of Mobile phone inside the lab is strictly prohibited, Defaulters will be viewed seriously.
- Do not run in the Machine shop
- Do not throw things
- Report any accident, however small, immediately
- Ensure hammer heads are not loose
- Wear uniform and shoes in the laboratory

Do's

- Ensure you know how to start and stop your machine
- Ensure that all guards are in position before starting the machine
- Ensure the feed mechanism is in neutral position
- Check the direction of chuck rotation before starting the operation

Don'ts

- Do not wear rings, watches, ties etc.
- Do not interface with electrical equipment.
- Do not touch evolving chuck or work piece.
- Ensure all guards are in position before starting the machine.
- Remove the chuck key immediately after use.
- Check direction of check rotation before starting the operation.
- Wear safety goggles and shoes.
- Keep hair short or wear a lap

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School of Mechanical Engineering

Department of Manufacturing Engineering

MACHINE SHOP

CHALLENGING EXPERIMENTS

- Study the influence of machining (turning/milling/grinding) parameters on surface finish
- Tool life study for a given process (turning/milling/drilling) for a given combination of process parameters.
- Lathe operations (Turning, grooving, chamfer, taper cutting and knurling)
- Making of suitable thread for a mat part (bolt or nut)
- Key way slot cutting using shaper or slotting or milling
- Drilling, Reaming and tapping
- Making a mating pinion or gear for the selected gear ratio.
- Gear Hobbing
- Grinding of single point cutting tool
- Machining of profiles using special purpose machine tools
- Measurement through Tool makers microscope
- Measurement of geometrical surfaces through CMM