

Swami Keshvanand Institute of Technology, Management & Gramothan

(An Autonomous Institute Affiliated to Rajasthan Technical University, Kota) (Accredited by NAAC with 'A⁺⁺' Grade) Approved by AICTE, Ministry of Education, Government of India Recognized by UGC under Section 2(f) of the UGC Act, 1956

Research Facilities at Department of Mechanical Engineering

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1. Department Overview

The Department of Mechanical Engineering at SKIT was established in the year 2003 with an annual intake of 60 students in the B. Tech. program. Presently the department is running the B. Tech program with an intake of 60 students and M. Tech programs in Renewable Energy Technology with intakes of 18. Department is also a recognized Ph. D. Research Center of RTU. The B. Tech. program of the department has been accredited and re- accredited by the National Board of Accreditation (NBA).

Department Vision

To become a nationally visible mechanical engineering department with excellence in teaching- learning, research and development, entrepreneurship and industry outreach activities.

• Department Mission

M1. To provide facilities and environment conducive to high quality education and research and development in the field of mechanical engineering.

M2. To inculcate technical, professional and communication skills in students, staff and faculty members.

M3. To instill innovative skills, critical thinking, leadership & team work in students through various teaching-learning activities and industry linkages.

M4. To inculcate strong ethical qualities in the students and faculty for realizing lifelong learning and serving the society and nation at large.

In alignment with the Vision and Mission of the Institute, Mechanical engineering department is highly committed to provide facilities and environment conducive to high quality education, training, research & development. The Institute has state-of-the-art research infrastructure and eco-system to carry out research work in various branches of engineering including mechanical engineering. The available facilities in mechanical department are rapidly expanding as the institute and department grows. The department already has a research centre recognized by affiliating university i.e. Rajasthan Technical University (RTU) with the prime focus on research in the field of Renewable Energy Technology and Production Engineering. A tremendous amount of research has been accomplished in recent years due to the availability of high-tech equipment and development activities funded by Institute management as well as Govt. agencies such as MODROB (AICTE), DST, MNRE and other funding agencies. Some of the key areas wherein students of B.Tech., M.Tech. and PhD programs are pursuing their research include:

- o Alternative/Bio-fuels
- o Emission characteristics and performance analysis of IC Engines
- Energy storage
- Solar energy utilization
- Optimization of machining parameters
- o Characterization of composite materials
- Study on machining parameters on 3-D printing machine
- o Robotics an Embedded system

• Faculty expertise (Research Supervisors)

Sr. No.	Name of The Supervisor	Research Area					
1.	Dr. Dheeraj Joshi	Production Engg, Industrial Engg., Engineering Optimization, Artificial Intelligence					
2.	Dr. Ashish Nayyar	IC engines and Alternative fuels, Solar Energy					
3.	Dr. Manoj Kumar Sain	Production and Industrial engineering, Ergonomics, Occupational Health, Quality Management					
4.	Dr. Deepak Kumar	Polymer composites, Optimization, Data Analytics					
5.	Dr. Manu Augstine	Design stage failure analysis					
6.	Dr. Chandan Kumar	Renewable Energy Technology					
7.	Dr. Achin Srivastav	Operations Management, Supply Chain Management, Evolutionary Algorithms, Artificial Intelligence, Expert Systems, Lean Six Sigma, CAD/CAM					
8.	Dr. Amit Jhalani	Alternate Fuels, Combustion, Energy and Environment, Renewable energy					
9.	Dr. Prem Singh	Design Optimization, Balancing of Mechanisms and Agricultural Machinery					

10.	Dr. Raj Kumar	Thermal engineering, Thermal analysis of composite materials					
11.	Dr. Vikash Gautam	Composites materials, Characterization of Materials, Wear, Friction, Tribology, optimization technique					
12.	Dr. Dharmendra Hariyani	Operations Management, SCM, Sustainability					

Research Scholars

S.No.	Student Name	Supervisors	Proposed Topic/Area
1.	Yogesh Kumar Sharma	Dr. Ashish Nayyar	Renewable Energy Technology
2.	Kovid Goyal	Dr. Ashish Nayyar	Renewable Energy Technology
3.	Sanjay Choudhary	Dr. Chandan Kumar	Renewable Energy Technology
4.	Saurabh Gupta	Dr. Chandan Kumar	Renewable Energy Technology
5.	Sumita	Dr. Raj Kumar	Renewable Energy Technology
6.	Sanjay Bariwa	Dr. Raj Kumar	Renewable Energy Technology
7.	Monika Chugh	Dr. Vikash Gautam	Sustainable development and characterization of Argo-waste incorporated bio-composites
8.	Monu Gupta	Dr. Deepak Kumar	Polymer Matrix composite
9.	Sudesh Garg	Dr. Prem Singh	Friction stir processing of structural Metallic Materials
10.	Nitin Goyal	Dr. Chandan Kumar	A study of sustainable alternative fuels for diesel engines
11.	Prashant Kumar	Prof. Dheeraj Joshi	Investigation of SiC, Graphite, and Marble Dust Reinforcement on AL6063 Hybrid Metal Matrix Composite for Two- Wheeler Brake Rotor Application
12.	Sandeep Kumar Bhaskar	Dr. Manoj Kumar Sain	Sustainable Machining
13.	Arun Beniwal	Dr. Chandan Kumar	Indirect type PV-T Based Solar Dryer for Agricultural Crops
14.	Jaiprakash Bhamaniya	Dr. Manoj Kumar Sain	Sustainable Manufacturing
15.	Ravi Sharma	Dr. Ashish Nayyar	Physico-Chemical Analysis and Calorific Values of Indian Deshi Gir Cow Manure
16.	Naveen Kumar Sain	Dr. Ashish Nayyar, Dr. Chandan Kumar	Studies on Solid Biomass as a Sustainable Energy Source
17.	Pramod Jain	Dr. Prem Singh	Optimum design of process parameters for Injection moulding machine

• Project/ consultancy undertaken

S.No.	Title of Idea/Project/Start- up/Event	Faculty/Student Name	Funding Agency	Status/Remarks
1	Hybrid Bike	Mr. Ajay Dhanopia	SKIT Incubation Cell	Completed
2	Multi-Functional Sprinkler Machine	Mr. Jitendra Meena (Student)	DoIT Rajasthan Govt.	In Process
3	Design and Fabrication of Rapid Milk-Can Chilling Jacket for Rural Development	Mr. Dinesh Sharma	SKIT Incubation Cell	Completed
4	Fabrication of a Electric Car	Mr. Ajay Dhanopia	SKIT Incubation Cell	Completed
5	Temperature Controlled Portable Solar Dryer for Drying Different Agriculture Product	Mr. Ankit Agarwal	SKIT Incubation Cell	In Process
6	Design and Development of a Mechanically Operated Small Scale Biomass Log Manufacturing Machine for Rural Development and Sustainable Waste Management	Mr. Naveen Sain	SKIT Incubation Cell	In Process

• Total publications and patents

- o Journal Articles 322
- Conference / In Proceedings 275
- o Books / Chapters 53
- Patents Published 13

13. Research Facilities

S. No.	Name of Equipment	Specification	Make	Research Application	Total Cost (Per unit in Rs.)	Bill no. & Date of purchase	View
1.	Digital Vibration Meter	Displacement (0-2000 microns pk-pk in freq range of 5 Hz-1000 Hz and velocity range 0-200 mm/s with ISO 10816 chart)	IRD Mech. analysis	• The equipment has facilitated the research in the manufacturing engineering domain as well as in the design and automation area.	85,993/-	INV23240474 Dated 02 March, 2024	
2.	Micro Fog Oil Mist Lubrication MQL System	MQL System with Liquid level Indicator, Filter Strainer, ¹ / ₂ " Air Pr. Gauge, 2m Nylon tube, Solenoid Valve & Float Switch.	Make: KENCO Brand	• To augment the multi-fuel injection system based research in production engineering domain.	57,997/-	252/KENCO/ 23-24 Dated 6 March, 2024	Big Big Big

3.	IBM SPSS	IBM SPSS Statistics Base-	IBM	• To augment ANOVA and	3,45,018/-	SPSS/82/2023	SPSS South Asis Private Limited TAX INVOICE (ORIGINAL FOR REC Instantion SSS SPSS South Asis Private Limited Instantion Date SSSS No. 500 - 701; 2m Floor, SHD D Doos SPSSS10000 SSSS SSSS
	Statistics-29.0	29.0 (with add-on packages of Advanced Statistics & Regression)		advanced data analysis as required in research works.		-24 dated 06 Oct., 2023	By DDC: 10: 10: 20 Mon By DDC: 10: 20 Mon By DDC: 10: 10: 20 Mon By DDC: 10: 20 Mon By DDC: 10: 20 Mon By DDC: 10: 20
4.	Bio-Diesel Plant	Reactor of 2 ltr capacity of made of SS304, with heating arrangement and insulated, stirrer arrangement, heating of conical flask made of SS304, PID controller, temperature sensors	Teaching Equipment	• To develop the Bio-diesel from various vegetable oils.	2,22,2542/-	04/24-25/ 26.10.2024	

5.	Micro Hardness Tester (Vickers)	A Table top Semi-automatic Micro Hardness Tester. Model: MHT-1000-AT with Large LCD Display Auto Turret along with Camera & Software suitable for above machine for case depth measurement	ACME Engineers, Dhayari, PUNE- 411041.	• To measure the hardness of the given test specimen and plot the characteristic curves.	7,19,800/-	2119 dated 20/06/2022	NICRO-HARDNESS TESTER
6.	Computerized Universal Testing Machine	Capacity: (2.5kN-30kN)	KALPAK INSTRUME NTS & CONTROLS , P U N E - 411 041	• To measure the tensile, compressive and flexural strength of the given test material (preferably polymer based)and plot the characteristic curves.	6,89,710/-	G-017 dated 21/05/2022	
7.	3D Printing Machine	MAX DUE- High Quality and Heavy Duty Fuse Deposition 250*250 mm	Raj Infotech Malviya Nagar Jaipur	• To produce intricate parts by 3D printing	3,12,700/-	3242/ 08-09-2020	Axzood

8.	Digital Surface Finish Tester	Display Unit Drive Unit Detector Carring Case connecting AC adaptor Roughness specimen calibration stage	Bombay Tools	• To check the surface finish of specimen or newly developed material	1,87,602/-	20200731/ 11-08-2020	
9.	CNC Ultrasonic Machine	Frequency 22 kHz Work Table Area 250*250*100 mm Tool Diameter 10 mm Spindle RPM Max 1000	K & K Engineers, Delhi	• For precise drilling and machining	3,35,000/-	55/ 19-08-2018	
10.	5-Gas Analyzer	AVL DiGas444, CO2, CO, O2, NOx and HC Gas Measurements and λ air fuel ratio	AVL India	• Exhaust Emissions Measurement including O ₂ , NOx, Sox, CO, CO ₂ , etc	2,96,016/-	2116170622/ 07-10-2016	Jaipur, Rajasthari, India Neoarreal book, Shvan Nage, Rannagariya, Jaipur, Rajasthan 80301 India Land Scheroz* Davig 5666259 Davig 76 6662259

11.	Milling Tool Dynamometer	XYZ Direction, 200 Kg, R- 350 ohm, V-12	Hitech Engineering & Testing Technology	• For force measurement on tool in three axes	37,800/-	HETT/ROK/S KIT/020 20/10/2015	First
12.	Pyranometer	Measuring range 0- 2000W/m ²	Delta Ohm	 Solar Intensity Measurement Facility Direct Beam Radiation and Diffuse Radiation Measurement 	3,38,405/-	04/ 09-05-2015	
13.	Parabolic Solar Concentrator	Temperature at focal point at different angle	Technical Teaching Equipment Bangalore	• It utilizes optical devices to absorb a large area of sunlight i.e. focusing a bundle of sunlight on a small area with the assistance of optical equipment parabolic in shape.	60,170/-	003/ 09-05-2015	

							Parabolic Solar Concentrator
14.	Sunshine recorder	Glass sphere diameter = 10 cm, weight = 5.7 kg, dimension: 200mm × 180mm × 250mm	Technical Teaching Equipment, Bangalore	To measure time period of sunshine in a day.	24,675/-	003/ 09-05-2015	
15.	Lux Meter	Measures from 0 to 50000 Lux/Fc in four range with resolution 0.1 Lux/Fc	HTA Instrumentati on (P) Ltd.	For measuring light illuminance by using the light sensor.	8,244/-	003/ 09-05-2015	

16.	Digital Weight Balance	Range – 220g, Accuracy – 0.001 g	Citizon	• To weigh the biofuel during blending	28000/-	3244/ 27-03-2015	
17.	Computerized Variable Compression Ratio, multi- Fuel, Computerized SI Engine Test Rig	Vertical, four stroke cycle, single acting, totally enclosed, high speed, SI engine, Make: Greaves Cotton & MK-25, 2.2 kW/ 3 HP @ 3000 rpm, Bore X stroke: 70 x 66.7	Technical Teaching Equipment, Bangalore (Greaves MK 25 HSP)	 Fully Computerized Controlled Variable Compression Ratio Engine Equipped with Eddy Current Dynamometer Exhaust Emission Analysis Facility Gaseous Fuel Induction Facility Spark Timing Controls 	10,16,785/-	011/ 21-06-2014	Vi Temple Vi Google United block Strain Nurgi, Rainagariya, Atakir, Rajarihan 303012, United block Strain Str
18.	Variable Speed dual fuel CI Engine Test Rig arrangement, Morse test facility	Make: HM STRIDE 4- Stroke,4-Cyclinder, 10 HP, 1500 rpm, bore X Stroke: 73x 88.9, CR: 1:23, hydraulic dynamometer, self-start, water cooled	Balaji Education Equipments	 Equipped with Hydraulic Dynamometer Multi Tank Facility for Alternative Fuels Setup Modification for Gaseous Fuel Injection Equipped with Exhaust Gas Recirculation Exhaust Emission Analysis Facility 	4,00859/-	003/ 21/06/2014	Image: State

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				• Smoke Measurement		l	
				Facility			
19.	Cleaveland Flash & Fire Point Apparatus	Determination of flash points of liquid samples, whose flash points are above 40 C to 350 C.	Technical Teaching Equipment, Bangalore	• To measure properties of fuel and lubricants	18,274/-	010/ 21-06-2014	
20.	Saybolt Viscometer	Covers the measurement of viscosities of petroleum products at temperature between 21° and 99°C	Technical Teaching Equipment, Bangalore	• To viscosity of liquid fuel or lubricants	10,420	010/ 21-06-2014	
21.	AVL smoke meter	AVL 437 C, accuracy: ±1%, range:0-100%	AVL India	• Smoke Measurement Facility	2,59,011/-	00005/ 09-04-2014	In Inc. Alper Relation Incl.

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22.	Axial Flow 3- Stage air Compressor	5 HP Motor, Jet pressure, 3 stage air compression	Technical Teaching Equipment, Bangalore	• Test and performance axial flow characteristics	6,91,002/-	T/28/ 22-08-2013	Balanter de la constante de la
23.	5-Axis Robotic Arm	5 kg lift, 5- Axis Drive with stripper motor	HYTECH Educational Equipment, Pune	• To study and research robotic motions	3,79,828/-	16/ 22-08-2013	
24.	Hydraulic Trainer	Single Acting Cylinder Double Acting Cylinder Rotameter Check Valve	HYTECH Educational Equipment, Pune	• To test and develop hydraulic circuits	81,000/-	01/ 06-03-2013	
25.	Variable Compression Ratio, multi- Fuel, Direct- Injection,	Make: Kirloskar-TV1 Type: Single cylinder, 4 stroke, VCR engine Bore × stroke (mm): 87.5×110	Technical Teaching Equipment, Bangalore	 Fully Computerized Controlled Compression Ratio, Injection Pressure, and Injection Timing Controls 	11,25,139/-	27/ 04-07-2012	

	Computerized CI Engine Test Rig	Compression ratio: 19:1 Rated power (kW): 3.75 Rated speed (rpm): 1500 Injection type: Direct injection Intake system: Naturally aspirates Injection pressure (bar): 210 Injection timing (°CA BTDC): 23 Cooling type: Water cooling Software used: LABVIEW	(Kirloskar TV1)	 Equipped with Eddy Current Dynamometer Multi Tank Facility for Alternative Fuels Exhaust Emission Analysis Facility Smoke Measurement Facility 			Lipur, Rajasthan, Indja W Tempo Control
26.	BOSCH Injection Pressure Testing Equipment	Pressure gauge Range: 0 - 400 BAR & 0 - 40 MPa	Bosch	• Measure and set the required injection pressure in fuel injector	11,677/-	HDEPD81/ 25-04-2009	Injection Pressure Testing Equipment
27.	Exhaust Gas Recirculation (EGR) setup for Diesel Engine	Surge tank, stainless steel EGR cooler, control valve	Legion Brothers, Bangalore	• Exhaust Gas Recirculation Control Facility	198,97/7-	10/ 18-04-2009	International and internationa

28.	Bomb Calorimeter	O ₂ Type	Savita Scientific, Haryana	• To measure the calorific value of fuels	44,248/-	34/ 18-04-2009	
29.	Pneumatic Trainer with air compressor	6 kg force per cm3 Size- 20 Litre	M/S Anest Iwata Motherson Ltd Noida	To test and develop pneumatic circuits	1,41,004/-	2613553/977/ 21-08-2006 06-09-2006	
30.	C N C Mill with Accessories	3 Axis Drive Simulation liner, table size 600*225 mm, job size 100*100*10 mm	HYTECH Educational Equipment, Pune	• For precise machining	6,94,069/-	06/ 27-07-2006	

31.	C N C Lathe with Accessories	2 axis drive simulation liner and circular, swing over bad 100 mm, max job diameter 30 mm	HYTECH Educational Equipment, Pune	• For precise machining	4,92,581/-	06/ 27-07-2006	
32.	4-Stroke 4- Cylinder Water Cooled Petrol Engine Test Rig with cylinder cut off arrangement, 10HP/1500RPM	Make: Issuzu, 10 HP, 1500 rpm, hydraulic dynamometer	Technical Teaching Equipment, Bangalore (Isuzu Automotuve)	 Morse Test Facility Equipped with Hydraulic Dynamometer Exhaust Emission Analysis Facility 	1,50,000/-	009/ 13-07-2005	Alpur, Rajasthan, India Alpur, Rajasthan, India Managarangan Managara
33.	2-Stroke 1- Cylinder Petrol Engine Test Rig	Make: Bajaj, 2.5HP/3000RPM	Technical Teaching Equipment, Bangalore (Bajaj)	 Modified with Multi Spark Plugs Motorised Run System for Indicated Power Measurement Exhaust Emission Analysis Facility 	11,0750/-	009/ 13-07-2005	Jebur Pajashan, India Jebur Pajashan, India Jebur Sassas Internet Google Google Google Option Hope

34.	Lathe Tool Dynamometer	XYZ Direction, 50 KN, 3 Independent for XYZ force with digital LED Dispaly	Neelam Engineering company, Agara	For force measurement on tool	30,250/-	102/ 19-05-2005	
35.	Drill Tool Dynamometer	XYZ Direction, 50KN, 3 Independent for XYZ force with digital LED Dispaly	Neelam Engineering company, Agara	• For force measurement on tool	26,048/-	102/ 19-05-2005	
36.	Single Cylinder, Four Stroke Diesel Engine Test Rig	Make: Kirloskar, AVI, CR: 1:17.5, 5HP, 1500 rpm, hydraulic dynamometer	Datacone (Kirloskar TV1)	 With Multi Fuel Tank Facility for Alternative Fuels Equipped with Exhaust Calorimeter Coupled with Hydraulic Dynamometer Variable Injection Pressure and Timing Smoke and Exhaust Emission Facility 	1,68,000/-	DL/0467/2005 / 15-01-2005	Image: Constraint of the state of

14. Collaborations

The department has active collaboration with professional societies/chapters namely American Society for Mechanical Engineers (ASME) and Society for Automotive Engineers India (SAE-INDIA). In addition, Robotics club also conducts 'Techfest' event every year in close collaboration and mentorship of IITBombay for the all-round development of students, faculty and staff.

An industrial collaboration with NESSCO INDIA Pvt. Ltd, Jaipur was also being done to provide support in plant & machinery, sample collection, training support, financial support during an industry-based problem solving project on 'Paper Cup Leakage Detection System'. In addition, Mr. Ajay Kumar Dhanopia, Associate Professor, Mech. Engg. Deptt. became a part of a collaborative project of SKIT and Bosch India Ltd. titled 'Youth Employability Skill in Higher Education'. The primary objective of this project was to train the faculty to ensure students focus on understanding the scope of skill based entrepreneurship, nation building behaviors, future competencies, and corporate collaboration under CSR.
