SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department of Mechanical Engineering

Abstract on the Department Level Data

Academic Year: 2025 -26 **Semester: EVEN**

S. No	Details	Count
1	Faculty Count	9
2	No. of Non-Teaching Faculty	5
3	No. of Doctorates	4
4	No. of Faculty Pursuing Ph.D.,	5
5	No. of Research Supervisor	1
6	Total No. of Publications	2
7	No. of Events Organized	8
8	No. of VAC Offered	-
9	No. of Industrial Visit made	-
10	No. of Active MoUs	7
11	No. of Events in which students participated in outside Institutions	2
12	No. of the Faculty with Participation in FDP / Conference / Seminars	9

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Faculty Publications

(All Peer – Reviewed Journals from 2026 Jan to Till Now)

Academic Year: 2025 -26 **Semester: EVEN**

S. No	Name of the Faculty	No. of Publications
1	Dr. M Selwin	**1**
2	Mr. R Sanjeevi	**1**

List of Publications in APA Style:

1. **Selwin, M.,** Nadir, A., Ponsuriyaprakash, S. (2026) Improving mechanical, thermal, and wear properties of 3D-printed PLA polymer using activated carbon powder derived from wood pulp. *Emergent Materials*, 9, 97(2006)

2. Ravi Raj, V., **Sanjeevi, R**., Ranjith Kumar, N., Shanmugham, N., Philip Selvaraj, D., Arul Kumar, H M., Anandha Prabhareddy S. (2026) Performance evaluation of Kevlar- Sisal- S- Glass hybrid composites with ceramic fillers for structural applications. Journal of Polymer & Composites. (Accepted for Publication)

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Departmental Events

Academic Year: 2025 -26 **Semester: EVEN**

S. No	Date	Event Details
1	04.02.2026-05.02.2026	Two days Hands on Training on Internet of Things and its applications by Mr. R. Ranjith, Accent Technosoft Solutions, Coimbatore.
2	12.02.2026	Inauguration of Product Development Centre by Mr. S. Sivaram, DGM-Production, TAFE, Madurai.
3	02.03.2026	Alumni Talk on " Core Company Work Environment and Industry Expectations by Mr. Rakulraj, Timken Research India Pvt Ltd, Chennai.
4	25.03.2026	Two days training program on Product Development and Manufacturing Validation using VISI by Mr. S.Y. Bawan, EUC Tech CAD/ CAM/ CAE solutions
5	25.03.2026	Alumni Expert session on " Career Pathways and Industry Expectation in the field of Mechanical Engineering by Mr. Mohamed Thariq.
6	07.04.2026	MECHISSM 2k26- Mechanical Symposium.
7	15.04.2026	Session on Advancing Academic Excellence through Research and Innovation by Dr. B Dhinesh, Mepco Schlenk Engineering College, Sivakasi.
8	17.04.2026	**Students Visit:** One day seminar on Tool and Die design Course at PSG College of Technology, Coimbatore on 17.04.2026.

Glimpses of Events Details

(Pictures with captions)

Two days Hands on Training on Internet of Things and its applications by Mr. R. Ranjith, Accent Technosoft Solutions, Coimbatore

Inauguration of Product Development Centre by Mr. S. Sivaram, DGM- Production, TAFE, Madurai

Alumni Talk on " Core Company Work Environment and Industry Expectations by Mr. Rakulraj, Timken Research India Pvt Ltd, Chennai

Two days training program on Product Development and Manufacturing Validation using VISI by Mr. S.Y. Bawan, EUC Tech CAD/ CAM/ CAE solutions

Alumni Expert session on " Career Pathways and Industry Expectation in the field of Mechanical Engineering by Mr. Mohamed Thariq

MECHISSM 2k26- Mechanical Symposium

Session on Advancing Academic Excellence through Research and Innovation by Dr. B Dhinesh, Mepco Schlenk Engineering College, Sivakasi

One day seminar on Tool and Die design Course at PSG College of Technology, Coimbatore on 17.04.2026

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

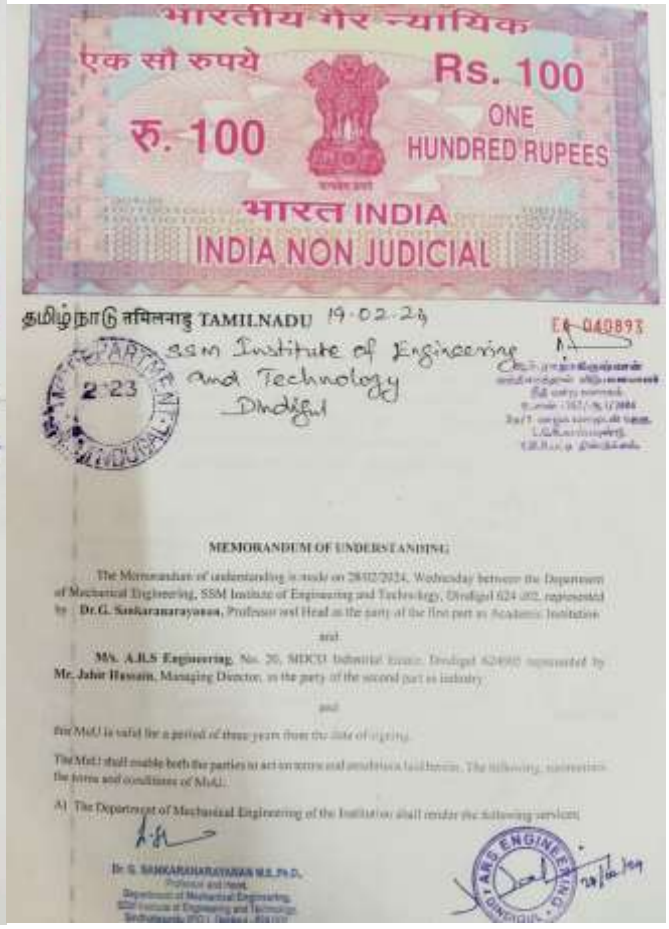
Department Of Mechanical Engineering

List of Active MOUs

Academic Year: 2025 -26 **Semester: EVEN**

S. No.	MoU Signed Company - Details	Date of MoU Signed	Validity
1.	TPM Tech Max Private Limited	10.06.2024	Three Years
2.	ARS Engineering	28.02.2024	Three Years
3.	DR Tech	19.02.2024	Three Years
4.	APLUS NDT Services	21.02.2024	Three Years
5.	UNIQUE MEP Engineering Academy Private Limited	16.11.2023	Three Years
6.	Shri Sai NDT	25.04.2023	Three Years
7.	SPOTLIGHT Technology	22.02.2023	Three Years


भारतीय गैर न्यायिक
एक सौ रुपये
Rs. 100
रु. 100
ONE HUNDRED RUPEES
भारत INDIA
INDIA NON JUDICIAL
தமிழ்நாடு தமிழ்நாடு TAMILNADU 10.06.2024 EA 059709
SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY/DINDIGUL
MEMORANDUM OF UNDERSTANDING
The Memorandum of understanding is made on 10/06/2024, Monday between the Department of Mechanical Engineering, SSM Institute of Engineering and Technology, Dindigul - 624 002, represented by Dr. G. SANKARANARAYANAN, Professor and Head of the Department as the party of the first part as Academic Institution
and
TPM TECH MAX PRIVATE LIMITED, P.NO.22, MUTHUPANDI NAGAR, KFC BACKSIDE, PONMENI BYEPASS, MADURAI - 625016 represented by Mrs. P. RENGANAYAKI, DIRECTOR, as the party of the second part as industry
and
this MoU is valid for a period of three years from the date of signing.
Further he MoU enables both the parties to perform the following activities for the mutual benefit and to bridge the gap between the institute and industry.
A) The Department of Mechanical Engineering of the Institution shall render the following services.
1) Product/material testing-related services.


भारतीय गैर न्यायिक
एक सौ रुपये
Rs. 100
रु. 100
ONE HUNDRED RUPEES
भारत INDIA
INDIA NON JUDICIAL
தமிழ்நாடு தமிழ்நாடு TAMILNADU 19.02.24 EA 040893
SSM Institute of Engineering and Technology Dindigul
MEMORANDUM OF UNDERSTANDING
The Memorandum of understanding is made on 28/02/2024, Wednesday between the Department of Mechanical Engineering, SSM Institute of Engineering and Technology, Dindigul 624 002, represented by Dr.G. Sankaranarayanan, Professor and Head as the party of the first part as Academic Institution
and
M/s. A.R.S Engineering, No. 20, SIDCO Industrial Estate, Dindigul 624005 represented by Mr. Jahir Hussain, Managing Director, as the party of the second part as industry
and
this MoU is valid for a period of three years from the date of signing.
The MoU shall enable both the parties to act on terms and conditions laid herein. The following, summarizes the terms and conditions of MoU.
A) The Department of Mechanical Engineering of the Institution shall render the following services.
Dr. G. SANKARANARAYANAN M.E.,Ph.D.,
Professor and Head,
Department of Mechanical Engineering,
SSM Institute of Engineering and Technology,
Dindigul-624 002.
A.R.S ENGINEERING DINDIGUL


भारतीय गैर न्यायिक
एक सौ रुपये
Rs. 100
रु. 100
ONE HUNDRED RUPEES
भारत INDIA
INDIA NON JUDICIAL
தமிழ்நாடு தமிழ்நாடு TAMILNADU 19.02.24 EA 040895
SSM Institute of Engineering and Technology Dindigul.
MEMORANDUM OF UNDERSTANDING
The Memorandum of understanding is made on 28/02/2024, Wednesday between the Department of Mechanical Engineering, SSM Institute of Engineering and Technology, Dindigul 624 002, represented by Dr.G. Sankaranarayanan, Professor and Head as the party of the first part as Academic Institution
and
D. R. Tech No. 11/1, SIDCO Industrial Estate, Dindigul - 624 005, Tamil Nadu, India represented by Mr. A. Annadurai, Managing Partner, as the party of the second part as industry
and
this MoU is valid for a period of three years from the date of signing.
The MoU shall enable both the parties to act on the terms and conditions laid herein. The following summarizes the terms and conditions of MoU.
A) The Department of Mechanical Engineering of the Institution shall render the following services.
Dr. G. SANKARANARAYANAN M.E.,Ph.D.,
Professor and Head,
Department of Mechanical Engineering,
SSM Institute of Engineering and Technology,
Dindigul-624 002.
DR TECH
11/1, Sidco Industrial Estate
DINDIGUL - 3


भारतीय गैर न्यायिक
बीस रुपये
Rs.20
रु.20
TWENTY RUPEES
INDIA
INDIA NON JUDICIAL
தமிழ்நாடு தமிழ்நாடு TAMIL NADU 21.02.23 2216 844616
SSM Institute of Engineering and Technology Dindigul
MEMORANDUM OF UNDERSTANDING
The Memorandum of understanding is made on 31/03/2023, Friday between the Department of Mechanical Engineering, SSM Institute of Engineering and Technology, Dindigul - 624 002, represented by Dr.D.SENTHILKUMARAN, Principal as the party of the first part as Academic Institution
and
APLUS NDT SERVICES, 266, Gowrham Complex 3rd Floor, 2nd Street, Gandhipuram, Coimbatore, Tamil Nadu 641 012 represented by Mr.R.Lawrance, Chief Executive Officer, as the party of the second part as industry
and
this MoU is valid for a period of three years from the date of signing.
Further he MoU enables both the parties to perform the following activities for the mutual benefit and to bridge the gap between the institute and industry.
A) The Department of Mechanical Engineering of the Institution shall render the following services.
i. Provide process and quality-oriented consultancy services on-request basis.
ii. Provide energy audit studies in the industry and their client units.
iii. Undertake in-plant trials for effective work methods to achieve enhanced results.

भारतीय गैर न्यायिक

बीस रुपये Rs.20

रु.20 TWENTY RUPEES

INDIA

INDIA NON JUDICIAL

தமிழ்நாடு TAMIL NADU 15.11.2023 30AC 375151

SSM INSTITUTE OF ENGINEERING TECHNOLOGY / DINDIGUL

MEMORANDUM OF UNDERSTANDING

This **Memorandum of Understanding** (hereinafter called as the 'MOU') is entered into on this day of Sixteen[th] day of Eleventh Month of Two Thousand and Twenty-Three (16/11/2023), by and between

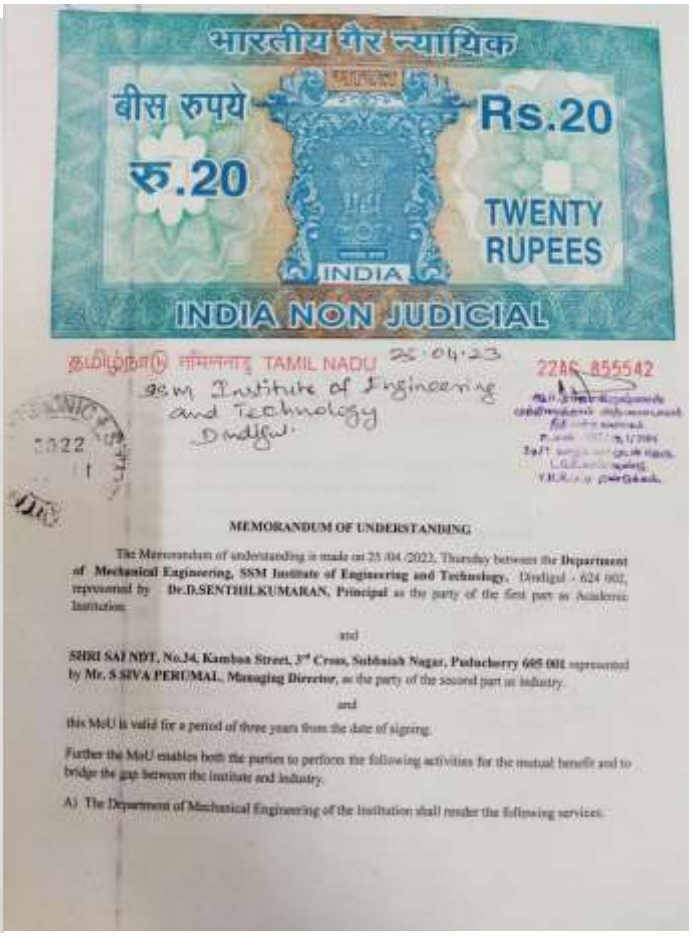
SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY, DINDIGUL-PALANI HIGHWAY, DINDIGUL THE FIRST PARTY, represented herein by its **Principal** (hereinafter referred as **'First Party'**, the institution which expression, unless excluded by or repugnant to the subject or context shall include its successors — in-office, administrators and assigns).

AND

UNIQUE MEP ENGINEERING ACADEMY PRIVATE LIMITED, CHENNAI THE SECOND PARTY, and represented herein by its **Founder,** (hereinafter referred to as **"Second Party"**, company which expression, unless excluded by or repugnant to the subject or context shall include its successors — in-office, administrators and assigns)

Dr. D. SENTHIL KUMARAN (First Party and Second Party are hereinafter jointly referred to as Parties and Pvt. Ltd.

Director



भारतीय गैर न्यायिक

बीस रुपये Rs.20

रु.20 TWENTY RUPEES

INDIA

INDIA NON JUDICIAL

தமிழ்நாடு TAMIL NADU 25.04.23 22AC 855542

SSM Institute of Engineering and Technology Dindigul.

MEMORANDUM OF UNDERSTANDING

The Memorandum of understanding is made on 25 /04 /2023, Thursday between the **Department of Mechanical Engineering, SSM Institute of Engineering and Technology,** Dindigul - 624 002, represented by **Dr.D.SENTHILKUMARAN, Principal** as the party of the first part as Academic Institution

and

SHRI SAI NDT, No.34, Kamboa Street, 3rd Cross, Subhaish Nagar, Puducherry 605 011 represented by **Mr. S SIVA PERUMAL, Managing Director,** as the party of the second part as industry.

and

this MoU is valid for a period of three years from the date of signing.

Further the MoU enables both the parties to perform the following activities for the mutual benefit and to bridge the gap between the institute and industry.

A) The Department of Mechanical Engineering of the Institution shall render the following services.

भारतीय गैर न्यायिक

बीस रुपये Rs.20

रु.20 TWENTY RUPEES

INDIA

INDIA NON JUDICIAL

தமிழ்நாடு TAMIL NADU 22.02.2023 22AC 844752

SSM INSTITUTE OF ENGINEERING TECHNOLOGY / DINDIGUL

MEMORANDUM OF UNDERSTANDING
SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY
DINDIGUL
AND
SPOTLIGHT TECHNOLOGY
DINDIGUL

THIS **MEMORANDUM OF UNDERSTANDING (MOU)** made and executed on this 23rd of February 2023 **between: SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY,** an Educational institution, situated at Dindigul-Palani Highway, Dindigul, Tamil Nadu 624002 and represented by Dr. SENTHIL KUMARAN DURAIRAJ, Principal hereinafter called **SSMIET** (Which expression shall include its successors and assigns) of the first part;

AND

SPOTLIGHT TECHNOLOGY, a company registered and having office at 61, Arush Complex, First floor, AMC Road, Dindigul-1, and represented by, Mr. **A. STEPHEN GASPAR, Managing Director** hereinafter referred to as **SPOTLIGHT TECHNOLOGY,** which term shall mean and include, unless repugnant to the context and meaning thereof, its Successors, legal representatives and assigns, of the other part;

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Student Achievements (Excluding Sports)

Academic Year: 2025 -26 **Semester: EVEN**

S. No.	Name of the student	Class / Branch	Details of Achievements (Other Institution Participation)
1	SAMPATH A	III/Mech. Engg.	Won 1st Prize in Paper Presentation event conducted by NPR College of Engineering and technology, Dindigul
2	YOGARAJA N	III/Mech. Engg.	
3	BALA SURYA V	III/Mech. Engg.	Won 1st Prize in CAD Modeling event technology, conducted by NPR College of Engineering and technology, Dindigul
4	SAMPATH A	III/Mech. Engg.	Won 2nd Prize in Just a Minute (JAM) event technology, conducted by NPR College of Engineering and technology, Dindigul
5	SUGUMAR K	III/Mech. Engg.	Won 2nd Prize in Just a Minute (JAM) event technology conducted by NPR College of Engineering and technology, Dindigul
6	KAMALESH R	III/Mech. Engg.	
7	MUTHU HARIKISHORE C	III/Mech. Engg.	
8	PRINCE KUMAR D	II/ Mech. Engg.,	One day Manipulator Workshop organized by Robotics Club of Kongu Engineering College, Erode on 13.02.2026
9	MANIKANDAN M	III/Mech. Engg.	Presented a research paper entitled "**Sustainable Biogas Production from Waste Chicken Feathers and Tannery Wastewater: A Co-Digestion Approach**" in the International Conference on Smart Innovations in Engineering & Technology ***(ICSIET 2026)*** held at NPR College of Engineering and Technology on 28.09.2026.
10	SAKTHIVEL M	III/Mech. Engg.	
11	GOKUL LUMAR R	III/Mech. Engg.	

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Faculty Achievements

Academic Year: 2025 -26 **Semester: ODD**

S. No	Name of the Faculty	Faculty Participation, Presentation (Conferences) / Industry Connect / Certifications / QIP / FDP (List all the achievement in the Odd Semester)
1	Mr. C.Silambarasan	1. Attended conference on Automotive Design and Engineering 2026 organized by Confederation of Indian Industry (CII) at Chennai on 05.06.2026. 2. Participated in the training of 2W ICE to EV Conversion - Advanced Training Program from 27.01.206 to 05.02.2026 organized jointly by Automotive Skill Development Council and AR4 Tech, Coimbatore.

PROOF DETAILS

Name of the Faculty	Proof (Certificate Proof / Event Participation Proof with Captions)
Mr. C. Silambarasan	 **Attended conference on Automotive Design and Engineering 2026 organized by Confederation of Indian Industry (CII) at Chennai on 05.06.2026.**
Mr. C.Silambarasan	 **Participated in the training of 2W ICE to EV Conversion - Advanced Training Program from 27.01.206 to 05.02.2026 organized jointly by Automotive Skill Development Council and AR4 Tech, Coimbatore.**

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Faculty Achievements

Academic Year: 2025 -26 **Semester: ODD**

S. No	Name of the Faculty	Faculty Participation, Presentation (Conferences) / Industry Connect / Certifications / QIP / FDP (List all the achievement in the Odd Semester)
1	Mr.M.Prabakaran	1. Attended two days hands on training on UAV Technology: Build, Simulate and Fly Organized by PSNA UAV Tech Lab from 27.01.2026 to 28.01.2026 at PSNA College of Engineering and Technology, Dindigul. 2. Attended five days online FDP on Integrated Approaches to Composite Processing, Characterization and Applications enabled by effectives utilization of Modern Research Tools from 23.02.206 to 27.02.2026 organized by Sethu Institute of Technology, Madurai.

PROOF DETAILS

Name of the Faculty	Proof (Certificate Proof / Event Participation Proof with Captions)
Mr.M.Prabakaran	 PSNA COLLEGE OF ENGINEERING & TECHNOLOGY (An Autonomous Institution) AICTE | ANNA UNIVERSITY | NBA | NAAC A++ Estd : 1984 42 PSNA UAV TECH LAB CERTIFICATE OF PARTICIPATION This is to certify that Mr. M. Prabakaran, AP/Mech. Engg. SSM Institute of Engg. & Tech. Dindigul. has actively participated in the Two-Days Hands-on Workshop on "UAV TECHNOLOGY : BUILD, SIMULATE & FLY" organized by PSNA UAV TECH LAB and held on 27 & 28 January 2026 at PSNA College of Engineering and Technology, Dindigul Programme Co-ordinator Programme Convenor Principal Dindigul-624 622, Tamilnadu 0451-2554411 / 2554032 contact@psnacet.edu.in Two days hands on training on UAV Technology: Build, Simulate and Fly Organized by PSNA UAV Tech Lab from 27.01.2026 to 28.01.2026 at PSNA College of Engineering and Technology, Dindigul.
Mr.M.Prabakaran	 SETHU INSTITUTE OF TECHNOLOGY (An Autonomous Institution,Accredited with A++ grade by NAAC) Pulloor, Kariapatti - 626115 A++ NAAC DEPARTMENT OF MECHANICAL ENGINEERING CERTIFICATE This is to certify that PRABAKARAN M ASSISTANT PROFESSOR, SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY has actively participated in Five-Days Online Faculty Development Program on Integrated Approaches to Composite Processing, Characterization and Applications Enabled by Effective Utilisation of Modern Research Tools held on 23.02.2026 to 27.02.2026 organized by Department of Mechanical Engineering Sethu Institute of Technology, Pulloor, Kariapatti. CO-ORDINATOR Dr. B. MUTHU CHOZHA RAJAN CO-ORDINATOR Dr.A.PERUMAL HOD/MECHANICAL Dr.K.ARUN BALASUBRAMANIAN PRINICIPAL Dr.G.D.SIVAKUMAR FDP on Integrated Approaches to Composite Processing, Characterization and Applications enabled by effectives utilization of Modern Research Tools from 23.02.206 to 27.02.2026 organized by Sethu Institute of Technology, Madurai.

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Faculty Achievements

Academic Year: 2025 -26 **Semester: EVEN**

S. No	Name of the Faculty	Faculty Participation, Presentation (Conferences) / Industry Connect / Certifications / QIP / FDP (List all the achievement in the Odd Semester)
1	Dr. M. Selwin	**EVENT PARTICIPATION:** **1.** Completed the Faculty Development Program on **"Sustainable Materials and Technologies for Civil and Mechanical Systems"** organized by NPR College of Engineering and Technology from 25.05.2026 to 30.05.2026. **2.** Participated in the training of 2W ICE to EV Conversion - Advanced Training Program from 27.01.206 to 05.02.2026 organized jointly by Automotive Skill Development Council and AR4 Tech, Coimbatore. **3. Resource Person in "**One day hands on training workshop on The Makers Lab- 3D Edition" in Mangayarkarasi College of Engineering, Madurai on 27.03.2026 **PUBLICATIONS:** **a. Journal Publication:** 3. Published a journal on "Improving mechanical, thermal, and wear properties of 3D-printed PLA polymer using activated carbon powder derived from wood pulp" in Emergent Materials, Springer Nature, Vol:9, 97(2006) on 26.04.2026 (Impact Factor: 4.0) **b. Patent Publication:** **1.** Published the Indian patent "**Aramid Fiber Reinforced Composite Mechanical Joint for High Stress Industrial Machinery**" Application No.20261009735 A, Publication Date : 27/03/2026

PROOF DETAILS

Name of the Faculty	Proof (Certificate Proof / Event Participation Proof with Captions)
Dr. M. Selwin	 **Faculty Development Program on "Sustainable Materials and Technologies for Civil and Mechanical Systems" organized by NPR College of Engineering and Technology from 25.05.2026 to 30.05.2026**
Dr. M. Selwin	 **Participated in the training of 2W ICE to EV Conversion - Advanced Training Program from 27.01.206 to 05.02.2026 organized jointly by Automotive Skill Development Council and AR4 Tech, Coimbatore.**

Dr. M. Selwin	 **Resource Person in "One day hands on training workshop on The Makers Lab-3D Edition" in Mangayarkarasi College of Engineering, Madurai on 27.03.2026**
Dr. M. Selwin	 Published the Indian patent "**Aramid Fiber Reinforced Composite Mechanical Joint for High Stress Industrial Machinery**" Application No.20261009735 A, Publication Date : 27/03/2026

Dr. M. Selwin

Emergent Materials (2026) 9:97
https://doi.org/10.1007/s42247-026-01482-x

ORIGINAL ARTICLE

Improving mechanical, thermal, and wear properties of 3D-printed PLA polymer using activated carbon powder derived from wood pulp

M. Selwin[1] · Nadir Ayrilmis[2] · S. Ponsuriyaprakash[3]

Received: 23 September 2025 / Accepted: 17 March 2026

Abstract
Polylactic acid (PLA)-based biocomposites reinforced with activated carbon powder (ACP) were fabricated and characterized to evaluate their suitability for additive manufacturing applications. Composites with different ACP content were prepared by mixing a slurry and processing it into filaments using twin-screw extrusion for Fused Deposition Modelling (FDM) 3D printing. X-ray diffraction (XRD) analysis revealed the presence of ACP within the PLA matrix and its uniform dispersion, as well as enhanced structural ordering and the possible nucleation of PLA crystallites on ACP surfaces. Thermogravimetric analysis (TGA) indicated improved thermal stability for reinforced composites, with increased onset degradation temperatures and higher char residue. Fourier-transform infrared spectroscopy (FTIR) revealed interfacial interactions between PLA and ACP functional groups, contributing to enhanced adhesion. Mechanical evaluation identified the 90:10 wt% PLA/ACP composition as optimal, showing notable improvements over neat PLA: tensile strength by 55%, flexural strength by 41.5%, compressive strength by 52%, hardness by 43.6%, and impact strength by 147%. These enhancements were attributed to uniform ACP dispersion, strong interfacial bonding, crack-path deflection, and efficient stress transfer. Morphological analysis supported these results, showing minimal agglomeration at optimal filler loading. The optimized composite exhibited excellent filament quality and printability, thus validating its potential for application. The 90:10 PLA/ACP composite in particular demonstrated a combination of strength, toughness, thermal stability and wear resistance that is ideal for functional, load-bearing 3D-printed components in the automotive, aerospace, and consumer products industries.

Keywords Polylactic acid · Activated carbon powder · Additive manufacturing · Fused deposition modeling

1 Introduction

Three-dimensional (3D) printing, or additive manufacturing (AM), enables layer-by-layer fabrication of complex geometries from digital models, offering advantages in precision, design flexibility, and customized production [1, 2]. It has found applications across aerospace, automotive, biomedical, electronics, and consumer goods sectors [3]. In biomedical engineering, AM is applied to prosthetics, implants, and scaffolds, while automotive and aerospace industries use it for lightweight structural components [4, 5]. Major manufacturers such as Toyota, Ford, Kia, Mercedes-Benz, Volkswagen, Honda, and Bugatti have adopted AM for parts like ducts, dashboards, seat structures, and airless tires [6, 7]. Despite these advantages, AM faces challenges including high costs, slow build rates, limited build volumes, and inferior mechanical properties compared to conventional manufacturing [8]. Issues such as anisotropy, poor interlayer bonding, warping, shrinkage, and dimensional inaccuracies reduce part reliability [12–14]. Furthermore, the range of suitable materials remains limited; common thermoplastics like polylactic acid (PLA) and acrylonitrile butadiene styrene (ABS) are easy to print but exhibit low impact resistance, poor thermal stability, and weak interlayer adhesion [9–11].

✉ M. Selwin
selwin123mech@rmkcet.ac.in

[1] Department of Mechanical Engineering, RMK Institute of Engineering and Technology, Thudiyal, Tamilnadu, India
[2] Department of Wood Mechanics and Technology, Faculty of Forestry, Istanbul University-Cerrahpasa, Bahcekoy, Sariyer, Istanbul 34473, Turkey
[3] Department of Mechanical Engineering, Mangayarkarasi College of Engineering, Madurai, Tamilnadu, India

Published online: 13 April 2026

Published a journal on "Improving mechanical, thermal, and wear properties of 3D-printed PLA polymer using activated carbon powder derived from wood pulp" in Emergent Materials, Springer Nature, Vol:9, 97(2006) on 26.04.2026 (Impact Factor: 4.0)

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

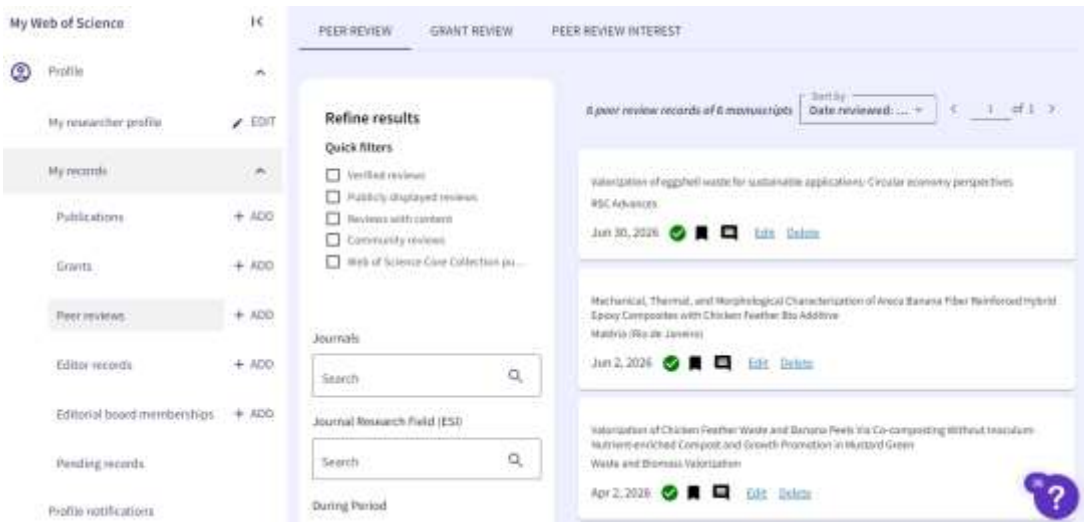
Department Of Mechanical Engineering

Faculty Achievements

Academic Year: 2025 -26 **Semester: EVEN**

S. No	Name of the Faculty	Faculty Participation, Presentation (Conferences) / Industry Connect / Certifications / QIP / FDP (List all the achievement in the Odd Semester)
1	Dr. P. Shankar Kannan	**1. Conference:** **Shankar Kannan Paramasivam**, Joseph Dominic Vijayakumar S, Gokul Kumar R, Sakthivel M, Manikandan M. (2026). "Sustainable Biogas Production from Waste Chicken Feathers and Tannery Wastewater: A Co-Digestion Approach" International Conference on Smart Innovations in Engineering and Technology (ICSIET 2026), Department of Mechanical Engineering, NPR College of Engineering and Technology, Dindigul, Tamil Nadu, India, from 28.04.2026 to 29.04.20265. **2. Supervisor Recognition:** Received Supervisor Recognition from Anna University Recognition Number: 4720004. **3. Review of Research Articles** Reviewed research article in Waste and Biomass Valorization, Energy Advances and Revista Materia Journals (SCI Indexed). **4. Two Days Workshop:** On "High-Impact Communication Training for Modern Academics" from 30.01.2026 to 31.01.2026 at Bisho Heber College, Trichy.

PROOF DETAILS

Name of the Faculty	Proof (Certificate Proof / Event Participation Proof with Captions)
Dr. P. Shankar Kannan	 Conference Certificate
	 Supervisor Recognition
	 Review Activity

CENTRE FOR LANGUAGE EMPOWERMENT AND DEVELOPMENT (LEAD)

through ADVANCED DIGITAL LANGUAGE LAB (ADLL)

Department of English

BISHOP HEBER COLLEGE (Autonomous)

Nationally Accredited with A++ Grade by NAAC with a CGPA of 3.69 out of 4

Tiruchirappalli-620017

CERTIFICATE OF PARTICIPATION

This is to certify that

Dr. Shankar Kannan

Assistant Professor, Department of Mechanical Engineering,

SSM Institute of Engineering and Technology, Dindigul

has participated in the Two day Consultancy Programme on

"High-Impact Communication Training for Modern Academics"

organized by Centre For LEAD through ADLL,

Bishop Heber College, Tiruchirappalli

on 30.01.2026 & 31.01.2026.

Dr. S. NAVAM KIRUBAI RAJAN
Co-Coordinator
Centre for LEAD

Dr. G. PARVARTHY
Coordinator
Centre for LEAD

DR. S. SOBANA
Head
Department of English

DR. J. PRINCY MERLIN
Principal

Ref. No. BHC/Eng/1029-2026/P-0130/C-32

Two Days Workshop

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Faculty Achievements

Academic Year: 2025 -26 **Semester: ODD**

S. No	Name of the Faculty	Faculty Participation, Presentation (Conferences) / Industry Connect / Certifications / QIP / FDP (List all the achievement in the Odd Semester)
1	Mr. D. Thamarai Selvan	1. Completed Online Faculty Development Program on **"Sustainable Materials and Technologies for Civil and Mechanical Systems"** conducted by NPR College of Engineering and Technology, Natham, from 25/05/2026 to 30/05/2026. 2. Attended one day seminar on Tool and Die design Course at PSG College of Technology, Coimbatore on 17.04.2026.

PROOF DETAILS

Name of the Faculty	Proof (Certificate Proof / Event Participation Proof with Captions)
Mr. D. Thamarai Selvan	 Two days hands on training on UAV Technology: Build, Simulate and Fly Organized by PSNA UAV Tech Lab from 27.01.2026 to 28.01.2026 at PSNA College of Engineering and Technology, Dindigul
Mr. D. Thamarai Selvan	 One day seminar on Tool and Die design Course at PSG College of Technology, Coimbatore on 17.04.2026

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

INTERNAL QUALITY ASSURANCE CELL - IQAC

Department Of Mechanical Engineering

Faculty Achievements

Academic Year: 2025 -26 **Semester: Even**

S. No	Name of the Faculty	Faculty Participation, Presentation (Conferences) / Industry Connect / Certifications / QIP / FDP (List all the achievement in the Odd Semester)
1	Mr. R. Sanjeevi	1.Completed One Week Online Faculty Development Program on **"AI Driven Research Methodologies: Engineering Faculty for Academic Innovation"** conducted by Sri Krishna College of Engineering and Technology, Coimbatore from 02/03/2026 to 06/03/2026. 2. Completed One day Awareness Program on **"IP Management Strategies for Startups and Entrepreneurs"** at iTNT Madurai Regional Hub, Anna University, Madurai on 25/03/2026. 3. Completed Online Faculty Development Program on **"Sustainable Materials and Technologies for Civil and Mechanical Systems"** conducted by NPR College of Engineering and Technology, Natham, from 25/05/2026 to 30/05/2026. 4. Completed AICTE QIP Post Graduate Course on **Robotics** at IIT Palakkad during the period of January – June 2026. 5. Attended one day seminar on Tool and Die design Course at PSG College of Technology, Coimbatore on 17.04.2026. 6. Research Paper entitled on Performance Evaluation of Kevlar – Sisal - S - glass hybrid composites with ceramic fillers for structural applications, Journal of Polymer and Composites,2026. **(Paper Accepted)**

PROOF DETAILS

Name of the Faculty	Proof (Certificate Proof / Event Participation Proof with Captions)
1.	

SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution, Approved by AICTE, Affiliated to Anna University, Accredited by NAAC with A++ Grade)
Kuniamuthur, Coimbatore - 641 008

SCHOOL OF MANAGEMENT

Certificate of Participation

This is to certify that **SANJEEVI R, ASSISTANT PROFESSOR, MECHANICAL ENGINEERING, SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY, DINDIGUL** has successfully participated virtually in the One-Week Online Faculty Development Programme (FDP) on **"AI-Driven Research Methodologies: Empowering Faculty for Academic Innovation"** organized by the School of Management, Sri Krishna College of Engineering and Technology, Coimbatore, held from 02 March 2026 to 06 March 2026.

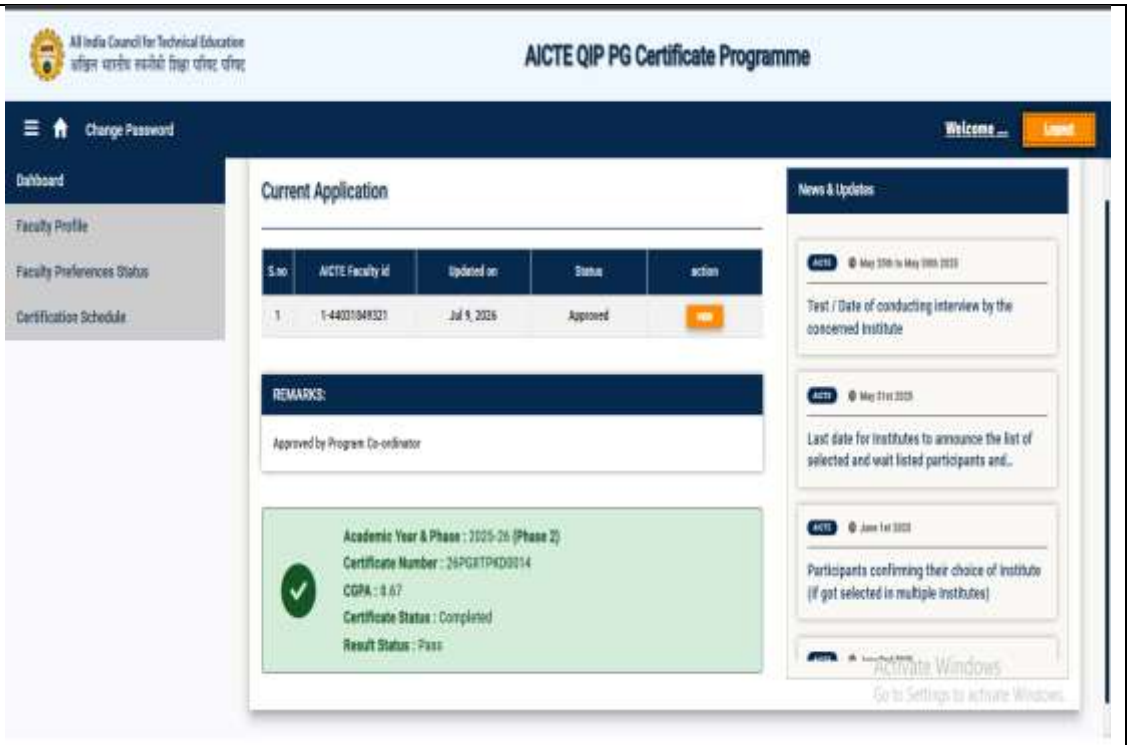
Dr. S. Swapna
PROGRAM COORDINATOR, SKCET

Dr. R T. Induji
PROGRAM COORDINATOR, SKCET

Dr.S.Jaisankar
HOD - SoM, SKCET

One Week Online Faculty Development Program on **"AI Driven Research Methodologies: Engineering Faculty for Academic Innovation"** conducted by Sri Krishna College of Engineering and Technology, Coimbatore from 02/03/2026 to 06/03/2026.

2.	 One day Awareness Program on **"IP Management Strategies for Startups and Entrepreneurs"** at iTNT Madurai Regional Hub, Anna University, Madurai on 25/03/2026.
3.	 Online Faculty Development Program on **"Sustainable Materials and Technologies for Civil and Mechanical Systems"** conducted by NPR College of Engineering and Technology, Natham, from 25/05/2026 to 30/05/2026.

4.	 AICTE QIP Post Graduate Course on **Robotics** at IIT Palakkad during the period of January – June 2026.
5.	 One day seminar on Tool and Die design Course at PSG College of Technology, Coimbatore on 17.04.2026.

6.

Journal of Polymer & Composites
ISSN(e): 2321-2810
Scientific Journal Impact Factor =6.005
Acceptance Letter

STM JOURNALS

Dear Author,

Congratulations on the acceptance of the article for publication in **Journal of Polymer & Composites**. This letter serves as our formal act **"Performance Evaluation of Kevlar-Sisal-S-Glass Hybrid Composites with Ceramic Fillers for Structural Applications"** acceptance of your paper. We affirm that your paper has met the Journal's Peer- Reviewed publication criteria.

Your diligent efforts and commitment have yielded success, and we are privileged to publish your work. Journal's editorial team has conducted a comprehensive review of your manuscript, and we believe it will add significant value to the field of Polymer and Composites.

Corresponding Author Name: G Ashwin Prabhu

Co-Authors: V Ravi Raj, R Sanjeev, P Ranjith kumar, N Sivabharagan, D Philip Selvaraj, H M Anil Kumar and S Anandha Prabhavathy

Manuscript Title: Performance Evaluation of Kevlar-Sisal-S-Glass Hybrid Composites with Ceramic Fillers for Structural Applications

Article received date: 19 June 2026

Article accepted date: 27 June 2026

Indexing: Chemical Abstracts Service (CAS), Cite Factor, Genomics, Google Scholar, Index Copernicus, Journal TOCs, Scientific Literature (SCILIT), Web of Sciences
Thank you very much for submitting your article.

With Best Regards,
Dr. Susarla Venkata Ananta Rama Sastry
Editor-in-Chief
Journal of Polymer and Composites

STM Journals, A Division of
Consortium e-Learning Network Pvt. Ltd.

Research Paper entitled on Performance Evaluation of Kevlar – Sisal - S -glass hybrid composites with ceramic fillers for structural applications, Journal of Polymer and Composites,2026. **(Paper Accepted)**