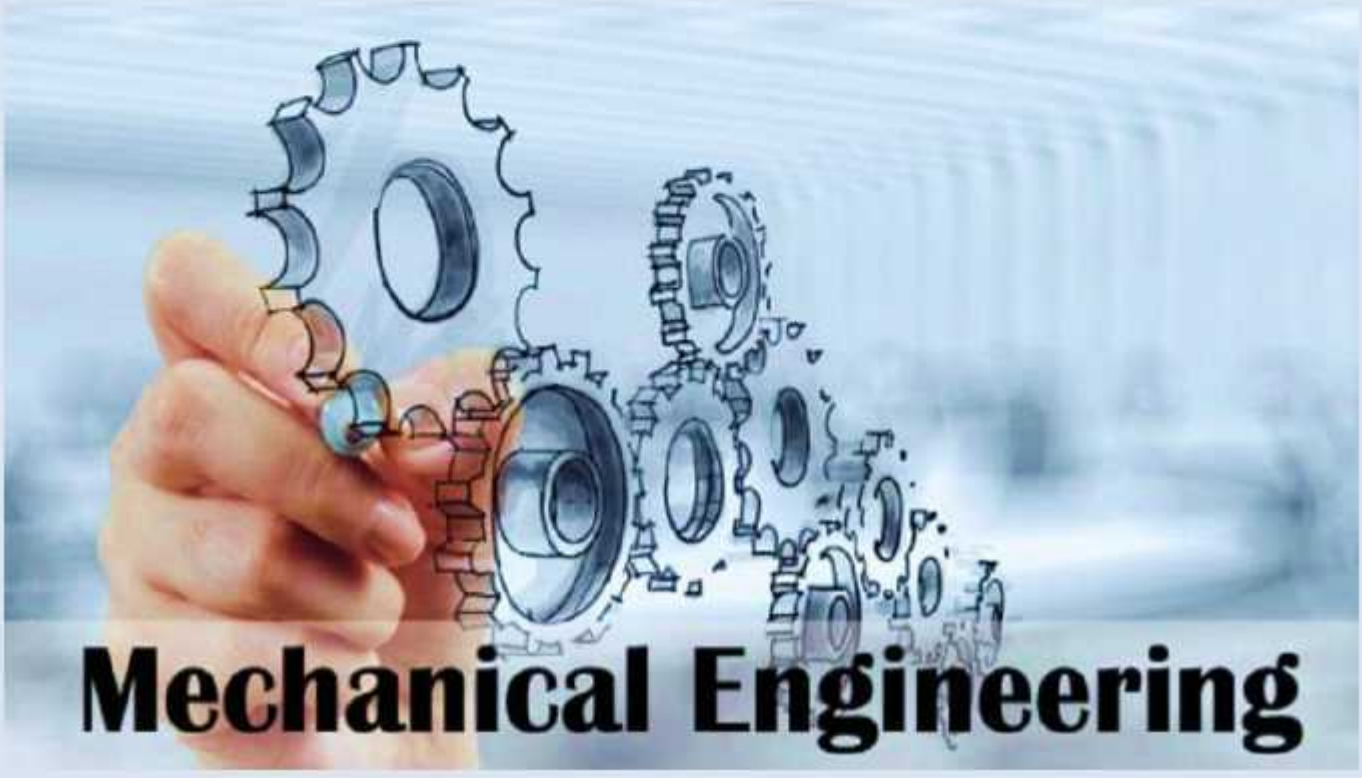
PMC TECH

INSPIRE TO INNOVATE

TECHNICAL MAGAZINE

2022-2023

DEPARTMENT OF MECHANICAL



From Founder's Desk

"Any place that anyone can learn something useful from someone with experience is an Educational Institution"

Time has now come to realize your dream to be in the main stream of your professional career and must be a great feeling to be a part of most prestigious one. PMC TECH has a history of more than 15 years. In recent years degree in the technical education like Engineering, has become the foremost academic qualification for all leading Industries, Government and Non-Government sectors. Academicians and Industrialists alike have recognized the value of the degree in the developing challenges of the rapidly changing technical environment. One of the strength of our campus is the diversity of programs and members background and experience. The range of functional, professional and vocational skills and knowledge that participants bring to the program allow the lecturing faculty to test the validity of theoretical concept against of rich background of personal and organizational outlooks. The Campus environment and work culture will encourage individuals from all walks of life and from all special and economic backgrounds.

From Chairman's Desk

"The object of education is to prepare the young to educate themselves throughout their lives"

True Education indeed paves the path for the children to learn new things in a correct manner. It heals them, broadens their perspectives and enriches their knowledge to face the globally competitive era. PMC TECH- Polytechnic started in 1996 with an objective to provide quality education and excellence in ever changing field of technical education. Technology is moving at a very fast pace. What was breakthrough yesterday is obsolete today. This has made it imperative that future technocrats must be familiar not only with technical skill but also with the technology of tomorrow. The maximum "survival of fittest" is more relevant now than ever before. We believe in value based quality education and faculty Members at PMC TECH – Polytechnic are striving hard for it

From Secretary's Desk

"Education is a progressive discovery of our own ignorance"

At PMC TECH, we value every individual and it is our aim to provide the best possible environment where students can succeed. Our campus has grown from its inception in 2002 to accommodate almost 3000 pupils in first-class teaching facilities which are amidst beautifully kept grounds. We are fortunate to have a talented, highly committed teaching and supporting staff here to ensure the learning environment of our students is the best it can be.

We seek to prepare our young men and women with the very best preparation for life after PMC TECH. Our departing Collegians should be well rounded individuals who are grounded in the Anglican way of faith, hope and love.

From Director's Desk

Er.Peurmal Manimekalai Polytechnic College is an institution that aims at the complete development of the student and our staff are a hand picked and trained to ensure that the students are given every possible support in all their Endeavour's academic or otherwise it is a multi disciplinary institution and this also ensures that the students have ready access to a wide range of academic material.

Our brand of education does not have narrow horizons, we believe in exposure. Our students are encouraged to widen their knowledge base and study beyond the confines of the syllabus.

From Principal's Desk

Er.Perumal Manimekalai Polytechnic College is continuously strive to impart Quality Education along with high ethical and Moral values which enable us, not only to mould our students as successful Diploma Engineers but also as disciplined citizens of our Nation. Also, we continuously upgrade and maintain world class infrastructure keeping in pace with the rapid technological developments.

We are committed to innovation and continuous improvement. We seek to wok closely in partnership with the students and their parents to maximize student performance and success regardless of their ability levels.

ABOUT OUR DEPARTMENT

- Department of Mechanical Engineering was established in the year 1996 to offer a quality education for the students hailing from rural area and meet the industrial demands.
- Mechanical Engineering is the branch of engineering that applies the principles of physics and material science for analysis, design, manufacturing and maintenance of mechanical system.
- The engineering field requires an understanding of core concept including mechanics, thermodynamics, material science, Design, CNC programming.
- Mechanical engineers use these core principles along with the machinery like computer aided manufacturing, computer integrated manufacturing, product life cycle management to design and analyse plants, equipment's and machineries.
- Employment opportunities available for Mechanical engineering diploma holders are found across the entire spectrum of manufacturing industry.
- Different carrier opportunities available for a diploma holder in mechanical engineers, Quality control engineers, Production engineers, Maintenance engineers, and CNC programmer and Design engineers.
- Higher studies opportunities are they can go for Mechanical Engineering, Production engineering, Aeronautical engineering and Post diploma in plastic technology offered by CIPET and Post Diploma Tool Design offered by NTTF.

VISION OF THE DEPARTMENT

- "Achieve excellence in Mechanical Engineering by imparting technical and professional skills along with ethical values".

MISSION OF THE DEPARTMENT

- Educate, prepare and mentor the students for successful careers in their domain of interest.
- Provide infrastructure and conducive environment to get good knowledge and professional skills.
- Motivate the students to follow ethical values and to develop innovative technologies to cater societal needs.

QUALITY POLICY

PMC TECH is committed to create quality professional to meet the emerging industrial and social needs through.

- Innovative teaching
- Industry institute interaction
- Placing faith in human values
- Meeting regularity requirements and aiming continual improvement in all activities.

Program Educational Objectives

- Have strong foundation in the mathematical, scientific and mechanical engineering fundamentals to solve complex engineering problems
- Have successful careers in mechanical industry that meets the need of the society
- Have conducive environment to explore innovation and professional skills
- Become a successful entrepreneur with social responsibilities and ethics to serve the society

Program Specific Outcomes

- Ability to produce mechanical engineering components with the acquired knowledge.
- Ability to design, develop need based products in mechanical engineering.
- Ability to function various domains of mechanical engineering related with Manufacturing Process, Thermal Engineering, Automobile Engineering and Design Engineering.

PROGRAMME OUTCOME

PO1: Basic and Discipline specific knowledge:

Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

PO2: Problem analysis:

Identify and analyse well-defined engineering problems using codified standard methods.

PO3: Design/ development of solutions:

Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4: Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5: Engineering practices for society, sustainability and environment:

Apply appropriate technology in context of society, sustainability, environment and ethical practices.

PO6: Project Management:

Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7: Life-long learning:

Ability to analyse individual needs and engage in updating in the context of technological changes.

Creative Desk

1. Mr D MUTHUKUMAR
   HOD (Admin)
2. Mr A KANAKESWARAN
   HOD (Academic)

Reviewer

1. Mr K JAYANTH
   Lecturer

Editor Incharge

1. Mr M.Manigandasakthivel
   Lecturer
2. Mr G Balasubiramani
   Lecturer
3. Mr N M Boopathi
   Lecturer
4. Mr S Pavendhiran
   Lecturer

Student Member

1. Selvan G Naveen kumar
2. Selvan K Balaji
3. Selvan K Arunkumar
4. Selvan M Samuel nesaraj

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IMPACT OF 5G IN MECHANICAL ENGINEERING

Mr A KANAKESWARAN
HOD (Academic)

- When the transition from 4G to 5G is complete, all industries and businesses will enjoy the faster and denser data streams that 5G brings. With speeds as high as 10 gigabits per second and latency (delay) less than five milliseconds, companies are looking forward to impressive gains in productivity and efficiency. In fact, speeds are claimed to be up to 100 times faster than 4G, accompanied by higher bandwidth and significantly increased connection density compared to today's networks. The faster speed and lower latency of 5G will advance the capabilities of IT and Internet of Things (IoT) technologies. These include wireless connectivity, machine-to-machine communications, data capture and analysis, artificial intelligence, simulations, 3D modeling, and virtual and augmented reality—all of which impact engineering and design.

Smarter Operations

Manufacturers are constantly looking for ways to boost efficiency and innovation by improving connections between people, equipment, and devices, especially through IoT technologies such as AI, machine learning, and robotics. "5G will help enable the concept of Industry 4.0, where factories will have much better flexibility using 5G, or even a 5G private network, to connect and operate on the factory floor," said FramAkiki, president of Joun Technologies, a technology consulting firm.

Design Freedom

5G will enable the creation of many new applications or the integration of existing products that were not possible before. Engineers will be able to develop faster and smarter devices for a variety of industries. "The higher bandwidth and low latency will transform existing applications and will likely create new ones that have yet to be imagined," said Shawn Carpenter, senior product manager at Ansys, a provider of engineering simulation and 3D design software.

Faster Prototyping

Speed of production and speed to market are critical objectives for manufacturing companies. Rapid prototyping is essential for achieving these goals. 5G can vastly speed up conventional subtractive machining methods or the additive manufacturing methods that are used to make production-ready prototypes. 5G can also help workers operate multiple stand-alone 3D printers simultaneously and control the prototyping process remotely.

Improved VR

Because of 5G's much faster speeds, virtual reality (VR) will be able to operate without a wired connection. In addition, the motion sickness that sometimes accompanies VR that is caused by the higher latency of 4G will be eliminated, allowing for the creation of more effective VR products. For example, the low latency of 5G will enable haptic applications like remote surgery that were previously impossible to accomplish due to the delay between a surgeon's hand movement and the remote actuator response.

Improved Digital Twins

5G will make digital twins more capable, providing faster data capture from IoT sensors and data analytics. Digital twins offer engineers virtual tools for managing assets and resources while improving performance. Not only will 5G enhance the effectiveness of digital twins in real-time, but 5G-enabled digital twins can also be used to assess the impact of 5G implementations

ELECTRIC VEHICLES

Mr D MUTHUKUMAR
HOD (Admin)

- In 2019, the United States imported about 3% of the petroleum it consumed, and the transportation sector accounts for approximately 30% of total U.S. energy needs and 70% of U.S. petroleum consumption. Using more energy efficient vehicles like hybrid and plug-in electric vehicles is an important part of continuing this successful trend of minimizing imported petroleum. This supports the U.S. economy and helps diversify the U.S. transportation fleet. Additionally, using an energy source such as electricity for transportation creates a resiliency benefit. The multiple fuel sources used in the generation of electricity results in a more secure and domestically generated energy source for the electrified portion of the transportation sector. All of this adds to our nation's energy security.
- Hybrid electric vehicles (HEVs) typically use less fuel than similar conventional vehicles,
because they employ electric-drive technologies to boost vehicle efficiency through regenerative braking—recapturing energy otherwise lost during braking. Plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles (EVs), also referred to as battery electric vehicles, are both capable of being powered solely by electricity, which is produced in the United States from natural gas, coal, nuclear energy, wind energy, hydropower, and solar energy.

COST

Although energy costs for hybrid and plug-in electric vehicles are generally lower than for similar conventional vehicles, purchase prices can be significantly higher. Prices are likely to equalize with conventional vehicles, as production volumes increase and battery technologies continue to mature. Also, initial costs can be offset by fuel cost savings, a federal tax credit, and state and utility incentives.

FUEL ECONOMY

HEVs typically achieve better fuel economy and have lower fuel costs than similar conventional vehicles. For example, FuelEconomy.gov lists the 2020 Toyota Corolla Hybrid at an EPA combined city-and-highway fuel economy estimate of 52 miles per gallon (MPG), while the estimate for the conventional 2020 Corolla (four cylinder, automatic) is 34 MPG. Use the Find a Car tool on FuelEconomy.gov to compare fuel economy ratings of individual hybrid and conventional models.

INFRASTRUCTURE AVAILABILITY

Public charging stations, or electric vehicle supply equipment, are not as ubiquitous as gas stations. Charging equipment manufacturers, automakers, utilities, Clean Cities coalitions, municipalities, and government agencies are rapidly establishing a national network of public charging stations. The number of publicly accessible charging stations reached more than 26,000 in 2020, offering more than 80,000 places to charge, according to the Alternative Fueling Station Locator. Search for electric charging stations near you.

EMISSIONS

Hybrid and plug-in electric vehicles can have significant emissions benefits over conventional vehicles. HEV emissions benefits vary by vehicle model and type of hybrid power system. EVs produce zero tailpipe emissions, and PHEVs produce no tailpipe emissions when in allelectric mode.

INDUSTRY 4.0

Mr K JAYANTH
Lecturer

The Fourth Industrial Revolution, 4IR, or Industry 4.0 conceptualizes rapid change to technology, industries, and societal patterns and processes in the 21st century due to increasing interconnectivity and smart automation. Coined popularly by the World Economic Forum Founder and Executive Chairman, Klaus Schwab, it asserts that the changes seen are more than just improvements to efficiency, but express a significant shift in industrial capitalism.

- A part of this phase of industrial change is the joining of technologies like artificial intelligence, gene editing, to advanced robotics that blur the lines between the physical, digital, and biological worlds. Throughout this, fundamental shifts are taking place in how the global production and supply network operates through ongoing automation of traditional manufacturing and industrial practices, using modern smart technology, large-scale machine-to-machine communication (M2M), and the internet of things (IoT). This integration results in increasing automation, improving communication and self-monitoring, and the use of smart machines that can
analyze and diagnose issues without the need for human intervention.

KEY THEME

Four themes are presented that summarize an Industry 4.0:

- Interconnection — the ability of machines, devices, sensors, and people to connect and communicate with each other via the Internet of things, or the internet of people (IoP)
- Information transparency — the transparency afforded by Industry 4.0 technology provides operators with comprehensive information to make decisions. Interconnectivity allows operators to collect immense amounts of data and information from
  all points in the manufacturing process, identify key areas that can benefit from improvement to increase functionality
- Technical assistance — the technological facility of systems to assist humans in decision-making and problem-solving, and the ability to help humans with difficult or unsafe tasks
- Decentralized decisions — the ability of cyber physical systems to make decisions on their own and to perform their tasks as autonomously as possible. Only in the case of exceptions, interference, or conflicting goals, are tasks delegated to a higher level

SMART FACTORY

Smart Factory is the vision of a production environment in which production facilities and logistics systems are organized without human intervention. The Smart Factory is no longer a vision. While different model factories represent the feasible, many enterprises already clarify with examples practically, how the Smart Factory functions.

PREDICTIVE MAINTENANCE

Industry 4.0 can also provide predictive maintenance, due to the use of technology and the IoT sensors. Predictive maintenance – which can identify maintenance issues in live – allows machine owners to perform cost-effective maintenance and determine it ahead of time before the machinery fails or gets damaged. For example, a company in Los Angeles could understand if a piece of equipment in Singapore is running at an abnormal speed or temperature. They could then decide whether or not it needs to be repaired.

3D PRINTING

The Fourth Industrial Revolution is said to have extensive dependency on 3D printing technology. Some advantages of 3D printing for industry are that 3D printing can print many geometric structures, as well as simplify the product design process. It is also relatively environmentally friendly

HYPERLOOP

Mr M.Manigandasakthivel
Lecturer

- A Hyperloop is a proposed high-speed transportation system for both passenger and freight transport. The term was coined by Elon Musk to describe the modern open-source project originally conceived in the 1900s. Hyperloop is described as a big vacuum sealed tube or a system of connected vacuum sealed tubes having very low air pressure through which a pod may travel substantially free of air resistance or friction.

- Proposed hyperloop designs employ three essential components: tubes, pods, and terminals. Here, a tube is a large sealed, low-pressure system. A pressurized coach (at atmospheric pressure) runs inside this controlled low-pressure environment (which is usually a long tunnel). A coach is often called a pod. The pod may use aerodynamic or magnetic propulsion to glide along a fixed guideway, with terminals handling pod arrivals and departures.

- The hyperloop has its roots in a concept by George Medhurst in 1799 and subsequently developed under the names pneumatic railway, atmospheric railway or vactrain. Elon Musk renewed interest in hyperloop after mentioning it in a 2012 speaking event. Musk further promoted the concept by publishing a white paper in August 2013, which conceived of a hyperloop route running from the Los Angeles region to the San Francisco Bay Area, roughly following the Interstate 5 corridor. His initial concept incorporated reduced-pressure tubes in which pressurized capsules ride on air bearings driven by linear induction motors and axial compressors. Transportation analysts challenged the cost estimates included in the white paper, with some predictions that a realized hyperloop would be several billion dollars over budget.

- The hyperloop concept has been "open-sourced" by Musk and SpaceX, and other companies or organizations have been encouraged to freely advance the technology, preferably in collaborations. TUM Hyperloop set the hyperloop speed record of 463 km/h (288 mph) in July 2019 at the pod design competition hosted by SpaceX in Hawthorne, California. Virgin Hyperloop conducted the first human trial in November 2020 at its test site in Las Vegas, reaching a top speed of 172 km/h (107 mph). Concept

- The vactrain concept was first invented by Robert H. Goddard as a freshman at Worcester Polytechnic Institute in 1904. Goddard subsequently refined the idea in a 1906 short story called "The High-Speed Bet" which was summarized and published in a Scientific American editorial in 1909 called "The Limit of Rapid Transit". Esther, his wife, was granted a US patent for the vactrain in 1950, five years after his death. Musk first mentioned that he was thinking about a concept for a "fifth mode of transport", calling it the Hyperloop, in July 2012 at a PandoDaily event in Santa Monica, California. This hypothetical high-speed mode of transportation would have the following characteristics: immunity to weather, collision free, twice the speed of a plane, low power consumption, and energy storage for 24-hour operations. The name Hyperloop was chosen because it would go in a loop. Musk envisions the more advanced versions will be able to go at hypersonic speed. In May 2013, Musk likened the Hyperloop to a "cross between a Concorde and a railgun and an air hockey table".

Human factors

Some critics of Hyperloop focus on the experience—possibly unpleasant and frightening—of riding in a narrow, sealed, windowless capsule inside a sealed steel tunnel, that is subjected to significant acceleration forces; high noise levels due to air being compressed and ducted around the capsule at near-sonic speeds; and the vibration and jostling. Even if the tube is initially smooth, ground may shift with seismic activity. At high speeds, even minor deviations from a straight path may add considerable buffeting.

FRICTION STIR WELDING

Mr G Balasubiramani
Lecturer

- Friction stir welding (FSW) is a solid-state joining process that uses a non-consumable tool to join two facing workpieces without melting the workpiece material. Heat is generated by friction between the rotating tool and the workpiece material, which leads to a softened region near the FSW tool. While the tool is traversed along the joint line, it mechanically intermixes the two pieces of metal, and forges the hot and softened metal by the mechanical pressure, which is applied by the tool, much like joining clay, or dough. It is primarily used on wrought or extruded aluminium and particularly for structures which need very high weld strength.
- FSW is capable of joining aluminium alloys, copper alloys, titanium alloys, mild steel,stainless steel and magnesium alloys. More recently, it was successfully used in welding of polymers. In addition, joining of dissimilar metals, such as aluminium to magnesium alloys, has been recently achieved by FSW. Application of FSW can be found in modern shipbuilding, trains, and aerospace applications.
- It was invented and experimentally proven at The Welding Institute (TWI) in the UK in December 1991. TWI held patents on the process, the first being the most descriptive.

Principle of Operation

- The FSW is performed with a rotating cylindrical tool which has profiled pin (also known a probe) having diameter smaller than the diameter of shoulder. During welding the tool is fed into a butt joint between two clamped workpieces, until the probe pierces into the workpiece and shoulder touches the surface of the workpieces. The probe is slightly shorter than the weld depth required, with the tool shoulder riding atop the work surface. After a short dwell time, the tool is moved forward along the joint line at the pre-set welding speed.
- Frictional heat is generated between the wear-resistant tool and the work pieces. This heat, along with that generated by the mechanical mixing process and the adiabatic heat within the material, cause the stirred materials to soften without melting. As the tool is moved forward, a special profile on the probe forces plasticised material from the leading face to the rear, where the high forces assist in a forged consolidation of the weld. This process of the tool traversing along the weld line in a plasticised tubular shaft of metal results in severe solid-state deformation involving dynamic recrystallization of the base material.

Micro-structural features

- The solid-state nature of the FSW process, combined with its unusual tool shape and asymmetric speed profile, results in a highly characteristic micro-structure. The microstructure can be broken up into the following zones:
  - The stir zone (also known as the dynamically recrystallised zone) is a region of heavily deformed material that roughly corresponds to the location of the pin during welding. The grains within the stir zone are roughly equiaxed and often an order of magnitude smaller than the grains in the parent material. A unique feature of the stir zone is the common occurrence of several concentric rings, which has been referred to as an "onion-ring" structure. The precise origin of these rings has not been firmly established, although variations in particle number density, grain size and texture have all been suggested.
  - The flow arm zone is on the upper surface of the weld and consists of material that is dragged by the shoulder from the retreating side of the weld, around the rear of the tool, and deposited on the advancing side.
  - The thermo-mechanically affected zone (TMAZ) occurs on either side of the stir zone. In this region the strain and temperature are lower and the effect of welding on the micro-structure is correspondingly smaller.

GUEST LECTURE

SL	Guest Name with Designation	Topic	Date
1	M.Muralidhar., M.E	E-Vehicle technology	13/04/2023

- Guest lecture conducted as a seminar session about mechanical system in various applications. The students understood the practical importance of mechanical systems in our day to day life.

- The session mainly focused on automobiles and air conditioning systems. It encouraged the students to learn more about mechanical systems

INDUSTRIAL VISIT

ASHOK LEYLAND INPLANT TRAINING, HOSUR (02/01/2023)

- The students of 3rd year Mechanical as visited Ashok Leyland, Hosur as industrial visit to gain knowledge about latest trend in industries and gone through the industrial disciplinary activities

SYMPOSIUM : TECHFEST 2K23

We have conducted national level technical symposium on 08.02.2023
Chief Guest :

Inaugural :
Mr P.P. Govindaraju
Principal
Government Polytechnic College, Kelamangalam

Valedictory :
Mr G Ramesh
Sr. manager, HR, Ashok Leyland, Hosur

FACULTY DEVELOPMENT PROGRAMME

- *To enrich the quality of professional skills and to update knowledge, our faculty members are participated in the Following Workshops.*
- *This programme trained faculties to improve from good to great faculty*

Students Achievements :

- Our Department students participate in National Level Technical Symposium at various colleges

S.NO	NAME OF COLLEGE	ACHIEVEMENT
1	Govt polytechnic college, Dharmapuri	First Prize
2	Excel Polytechnic College, Namakkal	Third Prize
3	Government Polytechnic College, Kelamangalam	First Prize
4	Kongu Polytechnic College, Erode	Second Prize

BEST STUDENT AWARD

- INDIAN SOCIETY FOR TECHNICAL EDUCATION (ISTE) awarded Mr.R.Kailash kumar of III mech as Best outgoing student on 21 st annual ISTE inauguration function held at Salem

SPORTS DAY

MECHANICAL GIRLS OVERALL CHAMPION

- Mechanical girls won the overall championship by using their maximum potential and talents.
- This shows women empowerment followed in our department

ANNUAL DAY CELEBRATION

PHOTO GALLERY

RECRUITERS


SANMAR
₹ 2,57,000 / annum
MUSASHI
₹ 2,50,000 / annum
HYUNDAI
₹ 2,00,000 / annum
₹ 2,00,000 / annum
Mastercraft
₹ 2,00,000 / annum
Nilkamal
₹ 2,00,000 / annum
Sigma AVIT
₹ 2,00,000 / annum
HTL Ltd.
₹ 1,92,000 / annum
Fairvalley
₹ 1,74,000 / annum
SCHAEFFLER
₹ 1,70,000 / annum
OrchidPharma
₹ 1,70,000 / annum
₹ 1,62,000 / annum
Rahul
₹ 1,62,000 / annum
SANDHAR
₹ 1,60,000 / annum
ASHOK LEYLAND
₹ 1,56,000 / annum
KANSAI NEROLAC
₹ 1,56,000 / annum
₹ 1,56,000 / annum
₹ 1,56,000 / annum
nsn
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OmniActive
₹ 1,56,000 / annum
TEAL
₹ 1,56,000 / annum
AVTEC
₹ 1,56,000 / annum
₹ 1,50,000 / annum
WOODTECH
₹ 1,50,000 / annum
GETster.TECH
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Mando
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MapVista
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natural
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