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EDUCATIONAL AND RESEARCH INSTITUTE
DEEMED TO BE UNIVERSITY



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Periyar E.V.R. High Road, Maduravoyal, Chennai-95. Tamilnadu, India.

**FACULTY OF ENGINEERING AND
TECHNOLOGY
DEPARTMENT OF MECHANICAL
ENGINEERING**

MESSAGE:

HOD

EDITOR'S

ARTICLES CORNER

1. Research Projects by Students & Faculty:
Driving Innovation and Knowledge Advancement
2. AI & Automation: Future Job Market Trends
3. Evolution of Waste Heat Recovery Systems
4. **INSPIRING PAPER CRAFT - A HOBBY**
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HOD-DESK

MESSAGE



by,
Dr.K.RAJAN,
HOD/Mech Engg.

HOD message:

Greetings!

I am delighted that Dr. MGR University has provided us with the opportunity and vision to support the release of the Newsletter series throughout all quarters of each academic year. This platform serves as a valuable forum to connect with all stakeholders.

I am especially pleased to see our department releasing the Newsletter for the period of April 2023 to June 2023. Wishing for many more successful editions ahead and a wonderful reading experience for all!

MESSAGE

It gives us immense pleasure to be an integral part of this Newsletter—a powerful communication platform tailored to the needs of the time. It serves as a bridge, delivering important messages about events, achievements, and key happenings to all concerned.

This initiative plays a crucial role in fostering a sense of belonging among faculty, alumni, and students. Life does not offer rewinds, only flashbacks, and our talented alumni hold a wealth of experience and skills to share with current students through talks and newsletters.

We believe our efforts will be truly successful when, after reading these articles, you feel inspired and motivated to contribute even more to future editions. Let's continue this journey of knowledge sharing and collaboration!

EDITORIAL BOARD

Mr.W.Andrew Nallayan - Asst Prof

Mr.D.A.Vinoth - Asst Prof

Hari Krishnan D - III Mechanical Engineering

Aravinth.V - III Mechanical Engineering

Parimala Sowmyaa N.V - III Mechanical Engineering

Jai Kishore.M - III Mechanical Engineering



ACTION CORNER

SNIPPETS FROM PALS AND OUR UNIVERSITY

JULY TO SEPTEMBER

DATE	EVENT TITLE	SPEAKERS	EVENT COORDINATE
17 July 2024	Subject Lecture on Quality Gurus and Their Contributions	K.RAJAN, Head of the Department, Dr. M.G.R Educational & Research Institute	
Vol:7 14 August 2024	Expert Lecture on Sustainable Energy	T.LAKSHAMANAN Professor S.R.M University	
23 August 2024	Interdisciplinary Lecture on Microprocessor Architecture and Embedded Programming	Lakshmi Narayanan Assistant Professor Dr. M.G.R. Educational and Research Institute	
14 August 2023	Technical Talk on MEMS In Industrial Automation	J. Gangai Pandian Manager Maitravaruna Technologies Private Limited	

PALS: AUGUST

EVENT: PALS VLAB FACULTY
DEVELOPMENT PROGRAM-BATCH 3
SPEAKER: Dr. K V GANGADHARAN
DATE: 15,16,17/08/2023
VENUE: NITK Surathkal

From 15th to 17th August 2023, PALS conducted the VLAB Faculty Development Program – Batch 3 at NITK Surathkal, led by Dr. K V Gangadharan, Professor of Mechanical Engineering. The program aimed to enhance the technical and teaching skills of faculty members, providing them with the latest insights into virtual labs and their applications in engineering education. Dr. Gangadharan's expertise played a key role in guiding participants through the development and effective use of virtual lab technologies to improve learning experiences.

Industry Trends and Future Job Opportunities

BY: Mr. Andrew Nallayan, Asst. Professor/ Mech Engineering

Introduction

As technology and globalization continue to reshape industries, the job market is experiencing rapid transformations. Emerging technologies, automation, and sustainability concerns are driving new career opportunities and changing the skill sets required for future professionals. This article explores key industry trends and the promising job opportunities that will define the workforce of the future.

Emerging Industry Trends

1. Artificial Intelligence (AI) and Automation

AI and automation are revolutionizing industries by enhancing efficiency and productivity. From machine learning and data analytics to robotics and natural language processing, businesses are integrating AI-driven solutions. This trend is leading to a demand for AI specialists, data scientists, and automation engineers.

2. Green Energy and Sustainability

With global efforts to combat climate change, industries are shifting towards sustainable practices. Renewable energy sources such as solar, wind, and hydrogen fuel cells are gaining momentum. Careers in environmental engineering, energy management, and sustainable infrastructure development are expected to grow.

3. Healthcare and Biotechnology Advancements

Advancements in biotechnology, telemedicine, and personalized medicine are transforming healthcare. The demand for bioengineers, geneticists, and AI-driven healthcare professionals is increasing. The COVID-19 pandemic has also accelerated the adoption of remote

4. Cybersecurity and Data Privacy

As digital transformation accelerates, cybersecurity has become a critical concern for businesses and governments. Cyber threats and data breaches are driving demand for cybersecurity experts, ethical hackers, and information security analysts.

5. Remote Work and Digital Transformation

The pandemic has solidified the shift toward remote work and digital collaboration. Companies are investing in cloud computing, virtual reality, and remote collaboration tools, creating opportunities for IT professionals, software developers, and digital marketing experts.

6. E-commerce and Logistics

With the rise of online shopping and supply chain innovations, e-commerce is thriving. Careers in logistics management, supply chain analytics, and last-mile delivery solutions are growing in importance.

7. Space Exploration and Aerospace

Private space companies and government initiatives are expanding space exploration, leading to increased demand for aerospace engineers, satellite technology experts, and space tourism professionals.

Future Job Opportunities

1. AI and Machine Learning Engineers

- Developing intelligent algorithms for automation and decision-making.
- Required Skills: Programming (Python, TensorFlow), data science, deep learning.

2. Renewable Energy Engineers

- Designing and maintaining solar, wind, and hydrogen energy systems.
- Required Skills: Electrical engineering, environmental science, sustainability.

3. Cybersecurity Analysts

- Protecting organizations from cyber threats and securing data.
- Required Skills: Ethical hacking, cryptography, risk assessment.

4. Healthcare Technologists

- Innovating in telemedicine, AI-driven diagnostics, and biopharmaceuticals.
- Required Skills: Biotechnology, medical AI, genetics.

5. E-commerce and Digital Marketing Specialists

- Enhancing online business strategies and customer engagement.
- Required Skills: SEO, data analytics, social media marketing.

6. Space Engineers and Scientists

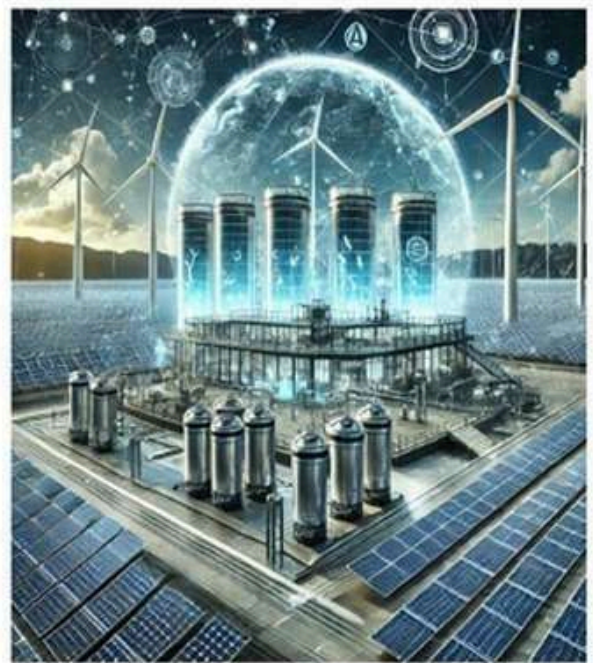
- Working on space missions, satellite technology, and aerospace advancements.
- Required Skills: Astrophysics, engineering, robotics.

7. Data Scientists and Analysts

- Interpreting big data for business and scientific applications.
- Required Skills: SQL, Python, data visualization, statistics.

Conclusion

The future job market will be defined by technological advancements and sustainability-driven initiatives. Professionals who continuously upskill in AI, green energy, cybersecurity, and emerging industries will have a competitive edge. As industries evolve, adaptability and a commitment to lifelong learning will be key to thriving in the workforce of tomorrow.



Sustainable Energy and Environmental Technologies: A Path to a Greener Future

BY: DR.K.V.GOPAL, ,MECHANICAL ENGINEERING

In the face of climate change, depleting fossil fuel reserves, and growing energy demands, the world is shifting towards sustainable energy solutions and advanced environmental technologies. These innovations aim to reduce carbon footprints, enhance energy efficiency, and promote ecological balance.

Sustainable Energy Sources

1. Solar Energy

Solar power harnesses the sun's energy using photovoltaic (PV) cells and concentrated solar power (CSP) systems. Advancements in solar panel efficiency, energy storage, and floating solar farms are making this renewable source more accessible and cost-effective.

2. Wind Energy

Wind turbines convert kinetic energy into electricity, providing a clean alternative to fossil fuels. Offshore wind farms and vertical-axis wind turbines are emerging innovations improving wind energy's reliability and output.

3. Hydropower

Hydroelectric plants generate energy by utilizing water flow. New approaches like small-scale hydro systems and kinetic river turbines reduce environmental disruption while maintaining energy efficiency.

4. Biomass and Biofuels

Biomass energy derives from organic materials such as agricultural waste and algae. Second-generation biofuels, such as ethanol and biodiesel, provide sustainable alternatives to conventional fuels with lower emissions.

5. Geothermal Energy

Harnessing the Earth's internal heat, geothermal energy offers a steady and renewable power source. Enhanced geothermal systems (EGS) and binary cycle power plants are improving efficiency and scalability.

6. Ocean Energy

Tidal and wave energy harness the natural motion of ocean water to generate power. Research on improving turbine efficiency and minimizing ecological impact is ongoing.

Environmental Technologies

1. Energy Storage Systems

Advanced battery technologies, such as lithium-ion, solid-state, and flow batteries, are critical for integrating renewable energy sources into the grid. Pumped hydro storage and hydrogen fuel cells also provide effective storage solutions.

2. Carbon Capture and Storage (CCS)

CCS technologies capture carbon dioxide emissions from industrial sources and store them underground, preventing their release into the atmosphere. Direct air capture (DAC) is an emerging method for reducing atmospheric CO2 levels.

3. Smart Grids and Energy Efficiency

Smart grids integrate digital technology to optimize electricity distribution, reduce wastage, and enhance demand response. Smart meters, AI-driven energy management, and decentralized microgrids contribute to better energy efficiency.

4. Sustainable Transportation

Electric vehicles (EVs), hydrogen fuel cells, and alternative fuels are revolutionizing transportation. Advancements in battery technology and charging infrastructure are making EVs more viable on a global scale.

5. Waste-to-Energy Technologies

Incineration, anaerobic digestion, and pyrolysis convert waste materials into energy, reducing landfill dependency and producing bioenergy.

6. Water Purification and Desalination

Sustainable water treatment technologies, such as reverse osmosis, solar desalination, and nanofiltration, ensure clean water availability with minimal environmental impact.

Conclusion

The transition to sustainable energy and environmental technologies is crucial for addressing global energy challenges and mitigating climate change.

Investments in research, policy support, and public awareness are essential to accelerating this transition, paving the way for a cleaner and more sustainable future.



AI & Machine Learning in Predictive Maintenance of Mechanical Systems

By: Aravinth.V,

3rd Yr, Mechanical Engg.

Introduction

Predictive maintenance (PdM) is transforming the way industries manage mechanical systems by minimizing downtime, reducing maintenance costs, and enhancing operational efficiency. The integration of Artificial Intelligence (AI) and Machine Learning (ML) in predictive maintenance is enabling data-driven decision-making, allowing industries to predict failures before they occur.

The Role of AI & ML in Predictive Maintenance

AI and ML utilize historical and real-time data to identify patterns, detect anomalies, and predict failures. The process involves the following key steps:

1. **Data Collection:** Sensors and IoT devices collect real-time data on temperature, vibration, pressure, and other operational parameters.
2. **Data Preprocessing:** The raw data is cleaned and formatted to remove noise and irrelevant information.
3. **Feature Engineering:** Important features are extracted from the data to enhance the accuracy of predictive models.
4. **Model Training & Deployment:** Machine learning models are trained using historical data and then deployed to monitor real-time operations.
5. **Failure Prediction & Maintenance Scheduling:** AI-driven insights help in scheduling maintenance activities before system failure occurs, reducing unplanned downtime.

AI Techniques Used in Predictive Maintenance

Various AI and ML techniques are applied in predictive maintenance, including:

- **Supervised Learning:** Algorithms like Decision Trees, Random Forests, and Support Vector Machines (SVM) classify and predict machine failures based on labelled datasets.
- **Unsupervised Learning:** Clustering techniques such as K-Means and Principal Component Analysis (PCA) help detect anomalies in machine behavior.
- **Deep Learning:** Neural networks, including Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks, are used for complex pattern recognition and time-series forecasting.
- **Reinforcement Learning:** AI models improve maintenance strategies by learning optimal actions through trial and error.

Benefits of AI & ML in Predictive Maintenance

The integration of AI and ML in predictive maintenance provides several benefits:

- **Reduced Downtime:** Early failure detection prevents sudden breakdowns, ensuring continuous operations.
- **Cost Savings:** Optimized maintenance schedules reduce unnecessary maintenance expenses and spare part replacements.
- **Increased Equipment Lifespan:** Proactive maintenance extends the operational life of machinery.
- **Enhanced Safety:** Predicting failures helps prevent hazardous conditions, improving workplace safety.
- **Data-Driven Insights:** AI-driven analytics enable industries to make informed decisions based on historical trends and real-time monitoring.

Industry Applications of AI-Based Predictive Maintenance

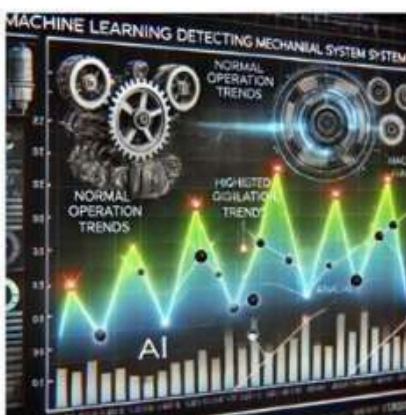
- **Manufacturing:** AI-driven PdM enhances production efficiency by preventing unexpected machine failures.
- **Automotive:** Predictive maintenance helps in detecting issues in vehicle components, reducing repair costs.
- **Energy Sector:** AI optimizes maintenance of turbines, generators, and power grids, minimizing downtime.
- **Aerospace:** AI ensures aircraft reliability by predicting failures in engines and critical components.
- **Oil & Gas:** Machine learning algorithms monitor pipelines and drilling equipment to prevent catastrophic failures.

Challenges & Future Outlook

Despite its benefits, AI-driven predictive maintenance faces challenges such as data quality issues, high initial costs, and the need for skilled personnel. However, advancements in AI, edge computing, and cloud analytics are expected to make predictive maintenance more accessible and efficient in the future.

Conclusion

AI and ML are revolutionizing predictive maintenance by enabling proactive, data-driven decision-making in mechanical systems. As technology continues to evolve, AI-powered maintenance strategies will become a standard practice across various industries, leading to improved reliability, cost savings, and enhanced safety.



INSPIRING PAPER CRAFT - A HOBBY

by, N.V.Parimala Sowmyaa, 3rd Yr, Mechanical Engg.

There's something uniquely satisfying about the humble old newspaper. Whether I'm lost in thought, watching TV, or simply feeling blue, my hands instinctively reach for its crisp pages—rolling, folding, and shaping them into miniature works of art. This readily available material, so easy to fold into delicate shapes or roll into fine cylinders, has become my favourite medium for crafting.

Origami—the mesmerizing art of transforming a single sheet of paper into intricate figures—has always fascinated me. With nothing but imagination and a few precise folds, an ordinary page can take on infinite forms, each infused with its own charm and character. The possibilities are boundless, limited only by creativity and patience.

Like many, I started my journey with the classic paper boat, delighting in the simple magic of watching it float. But soon, curiosity took hold. I ventured into crafting delicate butterflies, intricate dino baskets, and pop-up cards, each creation becoming more detailed and expressive. The greatest reward? The joy and surprise on the faces of those who received them—especially my mom, my first and most cherished audience.

Recently, my passion has grown beyond simple folds to structured paper roll sculptures, elevating my craft to new dimensions. One of my proudest creations is a fully crafted dining table, made entirely from tightly rolled newspaper tubes. I've also experimented with elegant flower vases, decorative lamp shades, and even an outdoor swing—each piece a testament to the resilience and versatility of paper.

The process is both meditative and deeply fulfilling. With a little patience, a keen eye for detail, and a spark of imagination, paper crafting proves that remarkable creations can emerge from the simplest materials—all at little to no cost.

I look forward to sharing more of my work, techniques, and creative journey in future issues. If you, too, find joy in shaping paper into something extraordinary, let's embark on this creative adventure together. After all, with a single fold, a new possibility is born.



Success Story of Jeff Bezos

by, Hari Krishnan D, 3rd Yr, Mechanical Engg

The Success Story of Zhong Shanshan: The "Lone Wolf" Billionaire

Introduction

Zhong Shanshan, the founder of Nongfu Spring, is one of China's most successful and mysterious billionaires. Rising from poverty and facing multiple career setbacks, he built a bottled water empire and became one of the richest men in Asia. Unlike many other billionaires who gained wealth through technology, Zhong's fortune comes from consumer goods and pharmaceuticals, proving that persistence and adaptability can lead to massive success.

Humble Beginnings

Born in 1954 in Hangzhou, China, Zhong's early life was filled with struggles. During the Cultural Revolution, he had to drop out of school at the age of 12. He later worked in various odd jobs, including as a construction worker and journalist, before transitioning into the business world.

The Entrepreneurial Journey

Zhong's first ventures were far from successful. He tried mushroom farming and various small businesses but failed multiple times. However, he never gave up. In 1996, he founded **Nongfu Spring**, a bottled water company that revolutionized the industry in China by promoting the idea of natural mineral water over purified water.

Nongfu Spring quickly became a household name, known for its premium water sourced from natural springs. The company's marketing and quality focus helped it dominate the Chinese beverage market, competing with global giants like Coca-Cola and Pepsi.

Expanding into Pharmaceuticals

Not content with just bottled water, Zhong also founded **Beijing Wantai Biological Pharmacy**, a company specializing in vaccines and medical testing. The company gained immense success, especially during the COVID-19 pandemic, when its diagnostic kits were in high demand.

Becoming a Billionaire

In 2020, Nongfu Spring went public on the Hong Kong Stock Exchange, making Zhong Shanshan one of the richest people in China, with a net worth surpassing \$60 billion at its peak. His success was unique because he did not rely on government ties or the tech industry, earning him the nickname “**The Lone Wolf**” in the business world.

Lessons from Zhong Shanshan’s Success

1. **Resilience** – He faced multiple failures but never stopped trying new business ideas.
2. **Identifying Market Needs** – He capitalized on China’s demand for high-quality drinking water.
3. **Diversification** – By investing in pharmaceuticals, he ensured financial stability beyond just one industry.
4. **Low Public Exposure** – Unlike other billionaires, Zhong avoids media attention, focusing entirely on business.

Conclusion

Zhong Shanshan’s journey from a school dropout to a billionaire highlights the power of determination and strategic thinking. His ability to spot opportunities and build an empire in consumer goods and healthcare proves that success is not limited to tech entrepreneurs. His story serves as an inspiration for aspiring business leaders looking to carve their own path.



ALUMNI CORNER

My college journey

BY, Subash Shivadev

Mechanical Engineering

May 2014 - May 2018



My College Journey at Dr. MGR University: A Story of Growth, Friendships, and Success

College isn't just about lectures, assignments, and exams—it's a life-changing experience that shapes who we become. My time at Dr. MGR University (May 2014 – May 2018) was an incredible rollercoaster of emotions, learning, and unforgettable memories. From the nervous first day to the thrill of landing my first job, every moment was a mix of challenges, discoveries, and personal growth. Looking back, these four years were not just about earning a degree but about building confidence, making lifelong friends, and finding my true path.

The Beginning: A New Chapter in Life

I still remember stepping through the gates of Dr. MGR University on my first day—excited, nervous, and clueless about what lay ahead. Coming from school, where everything was structured and familiar, college felt like an entirely different world. The campus was buzzing with students from different backgrounds, all carrying their own dreams and ambitions.

Figuring out my way around the massive buildings, lecture halls, and canteens was both thrilling and overwhelming. But soon, I realized that college wasn't just about academics—it was about making connections, stepping out of my comfort zone, and shaping myself for the future.

First-Year Challenges and Growth

The first year was a wake-up call. Managing my schedule, adapting to university-level studies, and making new friends wasn't as easy as I had imagined. Balancing lectures, assignments, and personal time was tough, and there were days when I felt completely lost.

Academically, the subjects were intense, pushing me to think differently. I spent long hours in the library, joined study groups, and slowly got the hang of things. Group projects and late-night exam revisions taught me teamwork, discipline, and perseverance. Even though it was challenging, the sense of accomplishment after each semester kept me going.

Beyond Books: Discovering Passion in Extracurricular Activities

College life wasn't just about textbooks—it was also about exploring new interests and finding what truly excited me. Extracurricular activities became a huge part of my journey, making my college life way more fun and meaningful.

- Joining the Society of Mechanical Engineering helped me understand real-world applications of my studies, attend workshops, and meet industry experts.
- Being part of the Event Management Club taught me leadership and organizational skills as we planned and executed college events.
- Volunteering for community service projects gave me a sense of fulfillment, reminding me of the importance of giving back to society.

Through these activities, I made amazing friends, built my confidence, and developed skills that would later help me in my career.

Memorable Moments and Achievements

One of the best experiences of my college life was participating in a national-level technical competition, where my team worked day and night to build an innovative project. The effort paid off when we secured second place, making all those sleepless nights worth it!

Another proud moment was presenting my research paper at a student conference. Standing on stage, explaining my ideas, and getting recognition from professors and peers was a confidence booster. These achievements weren't just about winning but about proving to myself that I could push my limits and succeed.

The Final Year: The Road to Success

By the time my final year (2017–2018) arrived, I was filled with mixed emotions—excitement for the future but also sadness knowing that my college journey was coming to an end. The pressure was real, with final projects, internships, and, of course, the much-anticipated campus placements.

The placement season was intense. I remember the nervousness before interviews and the endless preparations with my friends. Then came the best moment—getting the offer letter from a top energy company! That feeling of joy, relief, and pride was indescribable. After four years of hard work and struggles, this was the moment I had been waiting for.

Gratitude and Looking Ahead

As I stepped into the corporate world in May 2018, I realized how much I had grown during these years. I wouldn't have made it without:

- My professors, whose guidance and encouragement shaped my knowledge and confidence.
- My family and friends, who stood by me through all the ups and downs.
- Dr. MGR University, which gave me the platform to learn, explore, and become the person I am today.

College was more than just an education—it was a journey of self-discovery, filled with laughter, challenges, and unforgettable moments. As I move forward, I take with me the values, lessons, and friendships that will always remind me of my time at Dr. MGR University—a place that didn't just prepare me for a career but helped me find my purpose.

PUBLICATIONS

STAFF PUBLICATIONS APR-JUN 2024

1. Impact of DMC and Compression Ratio on a CRDI Engine Using Methyl Esters of Waste Cooking Oil

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Impact of DMC and Compression Ratio on a CRDI Engine Using Methyl Esters of Waste Cooking Oil

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2. Automated Sewage Well Desilting Machine to Eradicate Manual Scavenging under the Surveillance of IoT

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Automated Sewage Well Desilting Machine to Eradicate Manual Scavenging under the Surveillance of IoT

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3. Performance of nanofillers in epoxy resin for corrosion protection coating on metallic substrates

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Performance of nanofillers in epoxy resin for corrosion protection coating on metallic substrates

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ABSTRACT

In this study, a single-cylinder CRDI engine running on 20MEWCO (20 % Methyl Esters of Waste Cooking Oil + 80 % diesel) fuel was used to test various pilot injection timing modifications, including 34°, 36°, and 38° bTDC with a dwell period of 15° and 10 % pilot mass at a pressure of 500 bar. The analysis focused on cylinder pressure, heat release rate, fuel consumption, brake thermal efficiency, and emissions of carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO_x), and smoke.

As a result of advanced pilot injection timings, at 38° bTDC, the cylinder pressure, heat release rate, and brake thermal efficiency were 63.73 bar, 34.04 J/°CA, and 30.74 %, respectively. Emissions of HC, CO, and smoke increased significantly, while NO_x emissions were significantly reduced. Advanced pilot injection timing at maximum load caused a decrease in ignition delay, while shorter combustion duration resulted in more efficient combustion.

Keywords: pilot injection timing, waste cooking oil, dwell period, CRDI engine, emissions, combustion, ignition delay.

OTHER EVENTS IN OUR UNIVERSITY

