Vol:7 ISSUE 4-2024

Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
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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

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ARTICLES CORNER

1. The Future of Smart Braking Systems: Preventing Accidents with Technology
2. Automation in Waste Management: The Role of Mechanical Systems in Recycling
3. Hybrid Cooling Systems in Automobiles (Silencer Preheating & Peltier Cooling)
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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 for connecting with all stakeholders and fostering a sense of community.

I am especially pleased to see our department releasing the Newsletter for the period of October 2024 to December 2024. Wishing for many more successful editions ahead and an enriching reading experience for all!

Vol:7

ISSUE 4-2024

MESSAGE

Message:

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

Beyond being an information channel, the Newsletter fosters a strong sense of belonging among faculty, alumni, and students. Life does not offer rewinds, only flashbacks, and our talented alumni possess a wealth of experience and skills to share with current students through insightful talks and newsletters.

We believe our efforts will be truly meaningful 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, collaboration, and growth together!

EDITORIAL BOARD

Vol:7 ISSUE 4-2024

ACTION CORNER

SNIPPETS FROM OUR UNIVERSITY

OCTOBER TO DECEMBER

DATE	EVENT TITLE	SPEAKERS	EVENT COORDINATE
15 October, 2024	Subject Lecture on Thermodynamic Cycles	P.RAVICHANDRA GANESH, Assistant Professor, Dr.M.G.R Educational & Research Institute	
15 October 2024	Expert Lecture on Advancements in Non-Traditional Machining	Anmita Chakaraborthy Manager Technologies in Chennai	
23 October 2024	Professional Society Talk on Emerging Trends in Mechanical Society	K.Sabareeswaran Sr.Manager- Development Albonair India Pvt Ltd.	

Vol:7 ISSUE 4-2024

ARTICLES CORNER

Emerging Career Opportunities in 2025

by

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

Introduction

Braking technology has evolved significantly over the years, from manual drum brakes to advanced anti-lock braking systems (ABS). As road safety continues to be a critical concern, smart braking systems have emerged as a revolutionary solution to prevent accidents. These advanced systems integrate cutting-edge technologies such as artificial intelligence (AI), sensors, and automation to enhance vehicle safety, reduce collision risks, and improve overall driving efficiency.

Evolution of Braking Systems

Traditional braking systems relied entirely on mechanical components and driver intervention. With technological advancements, the automotive industry has introduced the following key developments:

1. **Hydraulic Brakes:** Introduced for smoother and more efficient braking.
2. **Anti-lock Braking System (ABS):** Prevents wheel lock-up and enhances vehicle control.
3. **Electronic Brake-force Distribution (EBD):** Optimizes braking force based on vehicle load.

Conclusion

Mechanical automation in waste management plays a pivotal role in improving recycling efficiency and sustainability. By integrating advanced sorting systems, shredders, and automated collection methods, modern waste management can significantly reduce environmental impact and enhance resource recovery. As technology continues to evolve, the future of automated recycling holds great promise in achieving a circular economy and promoting sustainable waste practices.

Benefits of Smart Braking Systems

1. Enhanced Safety

- Reduces the risk of rear-end collisions and pedestrian accidents.
- Improves reaction time in emergency situations.

2. Fuel and Energy Efficiency

- Regenerative braking enhances the efficiency of electric and hybrid vehicles.
- Reduces unnecessary braking, leading to improved fuel economy.

3. Reduced Wear and Tear

- Intelligent braking reduces mechanical stress on brake components.
- Minimizes maintenance costs and increases vehicle lifespan.

4. Adaptive and Predictive Braking

- AI-driven braking adapts to different driving conditions, enhancing overall control.
- Predictive braking ensures smooth stops and starts, improving passenger comfort.

Challenges and Future Prospects

1. High Implementation Costs

- Advanced braking technologies require expensive sensors and AI-driven systems, increasing vehicle costs.

2. Integration with Existing Infrastructure

- Widespread adoption of V2X communication depends on infrastructure development.
- Governments and manufacturers must collaborate for seamless integration.

3. Cybersecurity Risks

- Connected braking systems can be vulnerable to hacking and data breaches.
- Ensuring robust cybersecurity measures is crucial for safety.

4. Future Trends

- Fully autonomous braking with AI-powered decision-making.
- Improved V2X communication for better traffic management.
- Smart braking integration in two-wheelers and commercial vehicles.

Conclusion

The future of smart braking systems promises enhanced road safety, efficiency, and convenience. With continued advancements in AI, sensor technology, and connectivity, these systems will play a crucial role in reducing accidents and making transportation safer for everyone. As manufacturers and policymakers work together, smart braking will become a standard feature in modern vehicles, paving the way for an accident-free future.

Automation in Waste Management: The Role of Mechanical Systems in Recycling

BY: MR.R.T.CHANDER, Asst Professor, Mech Engineering

Introduction

Waste management has become a crucial global concern due to increasing urbanization and industrialization. Traditional waste disposal methods often lead to environmental pollution and inefficient recycling processes. Automation in waste management, particularly through mechanical systems, has significantly improved recycling efficiency, reduced human intervention, and enhanced sustainability. This article explores the role of mechanical systems in automating waste management and their impact on recycling processes.

The Need for Automation in Waste Management

Manual waste segregation and recycling processes are labor-intensive, time-consuming, and prone to human error. Inefficient sorting leads to contaminated recyclables, reducing their market value and effectiveness in sustainable waste management. Automation addresses these challenges by integrating mechanical and sensor-based technologies to streamline waste handling, sorting, and processing.

Key Mechanical Systems in Recycling

Several mechanical systems contribute to automating recycling processes, ensuring efficient sorting and resource recovery. These include:

1. Automated Sorting Systems

Automated sorting systems use conveyor belts, sensors, and robotic arms to segregate waste based on material composition, size, and weight. Technologies like:

- **Optical Sorting**: Utilizes near-infrared (NIR) sensors to differentiate plastics, paper, and metals.
- **Magnetic Separation**: Extracts ferrous metals from waste streams using powerful magnets.
- **Eddy Current Separators**: Remove non-ferrous metals like aluminum and copper.
- **Air Classification**: Separates light materials from heavy ones using controlled air streams.

2. Mechanical Shredders and Crushers

Shredders and crushers break down large waste materials into smaller, manageable sizes, improving efficiency in recycling plants. These machines are crucial for processing plastic, metal, glass, and electronic waste (e-waste), enabling easier handling and reuse.

3. Automated Waste Collection and Transport

Modern waste collection systems, such as smart bins equipped with sensors, alert collection units when full, optimizing collection schedules and reducing fuel consumption. Pneumatic waste collection systems use underground vacuum tubes to transport waste directly to processing centers, reducing street-level pollution and manual handling.

4. Biodegradable Waste Processing Machines

Composting machines and anaerobic digesters convert organic waste into useful byproducts like compost and biogas. Mechanical systems accelerate the decomposition process, reducing landfill dependency and contributing to renewable energy production.

These machines incentivize recycling by allowing users to deposit used bottles in exchange for rewards. They employ barcode scanners and mechanical crushers to sort and compact the materials for efficient recycling.

Benefits of Mechanical Automation in Recycling

The integration of mechanical systems in waste recycling offers numerous advantages:

- **Increased Efficiency**: Automated systems sort and process waste faster and more accurately than manual methods.
- **Cost Reduction**: Reduced labor costs and optimized resource recovery lower operational expenses.
- **Environmental Sustainability**: Improved recycling rates minimize landfill waste and reduce pollution.
- **Enhanced Safety**: Reduces human exposure to hazardous waste materials and minimizes workplace injuries.
- **Scalability**: Adaptable to varying waste volumes and diverse recycling needs.

Challenges and Future Prospects

Despite its benefits, automation in waste recycling faces challenges such as high initial investment costs, maintenance requirements, and the need for advanced technology integration. However, ongoing advancements in artificial intelligence (AI), robotics, and sensor technology promise further improvements in waste management automation.

Future trends include AI-driven robotic sorters with machine learning capabilities, decentralized waste processing units, and smart waste tracking systems that enhance transparency and efficiency in waste management.

Conclusion

Mechanical automation in waste management plays a pivotal role in improving recycling efficiency and sustainability. By integrating advanced sorting systems, shredders, and automated collection methods, modern waste management can significantly reduce environmental impact and enhance resource recovery. As technology continues to evolve, the future of automated recycling holds great promise in achieving a circular economy and promoting sustainable waste practices.

Hybrid Cooling Systems in Automobiles (Silencer Preheating & Peltier Cooling)

By: Jai Kishore.M,

3rd Yr, Mechanical Engg.

Introduction

With the growing need for improved fuel efficiency and reduced emissions, hybrid cooling systems in automobiles are gaining significant attention. One such innovative approach integrates **silencer preheating** and **Peltier cooling** to optimize engine performance, improve thermal management, and enhance fuel economy. This article explores how these two technologies work together to form an efficient hybrid cooling system.

1. Silencer Preheating System

The **silencer preheating system** utilizes exhaust heat from the silencer to preheat incoming fuel or air before combustion. This process enhances combustion efficiency, reduces fuel consumption, and minimizes emissions.

Working Principle:

- The silencer, which is part of the exhaust system, generates significant heat as the engine operates.
- A heat exchanger or coiled piping is integrated into the silencer to capture this heat.
- The captured heat is transferred to either the fuel or intake air, improving vaporization and combustion.
- This leads to a **more complete burn**, reducing unburnt hydrocarbons and enhancing mileage.

Advantages:

- Improves fuel efficiency by enhancing the combustion process.
- Reduces engine warm-up time in cold conditions.
- Decreases emissions by ensuring better fuel burning.
- Utilizes waste heat, increasing overall system efficiency.

2. Peltier-Based Cooling System

The **Peltier cooling system** uses thermoelectric modules to create a temperature difference by passing an electric current through semiconductor materials. This system can be employed in automobiles to cool engine components, electronic control units (ECUs), or cabin interiors.

Working Principle:

- A Peltier module consists of two ceramic plates with semiconductor material in between.
- When an electrical current flows through the module, one side absorbs heat (cold side), while the other releases it (hot side).
- The cold side can be used for **cooling sensitive vehicle components**, while the hot side dissipates excess heat into the atmosphere or through a heat sink.

Applications in Automobiles:

- **Engine Cooling:** Helps in cooling engine components, reducing overheating risks.
- **Battery Cooling:** Maintains optimal battery temperature in electric and hybrid vehicles.
- **Cabin Cooling:** Supplements traditional air conditioning for better efficiency.

Advantages:

- Provides efficient and compact cooling without moving parts.
- Offers instant cooling response upon activation.
- Works on electrical power, making it suitable for hybrid and electric vehicles.

3. Hybrid Integration: Combining Silencer Preheating & Peltier Cooling

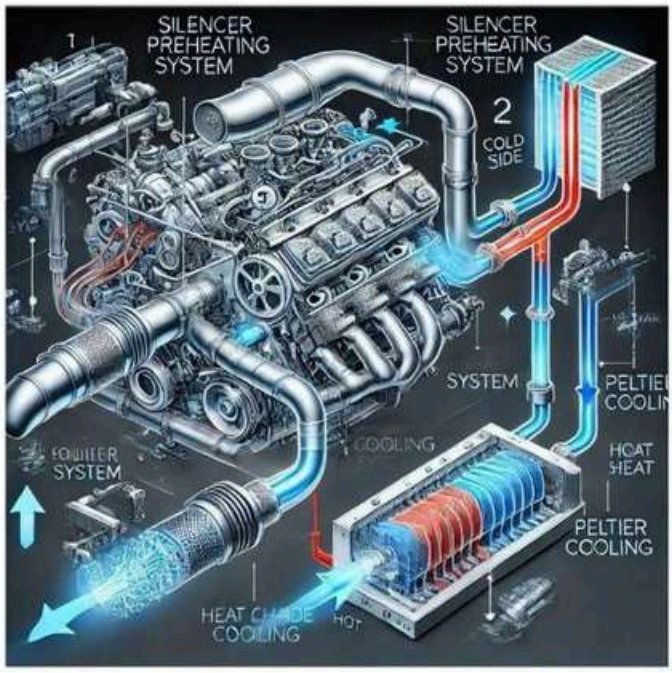
By integrating **silencer preheating and Peltier cooling**, a hybrid system can be developed to improve vehicle efficiency holistically.

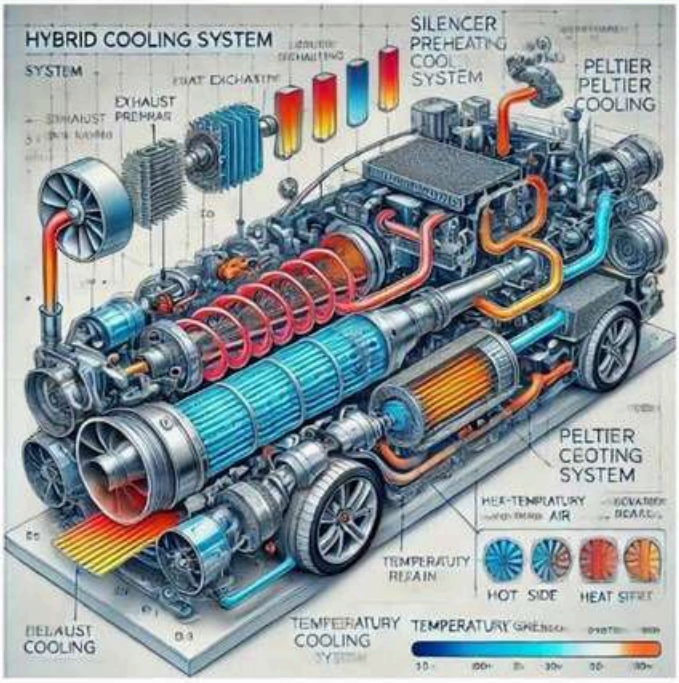
How It Works Together:

- **Heat Recovery & Reuse:** The exhaust heat is recovered for preheating the fuel/air, while Peltier modules cool components.
- **Optimized Thermal Management:** Silencer preheating ensures better fuel combustion, and Peltier cooling prevents overheating.
- **Enhanced Fuel Efficiency:** Preheated fuel burns more efficiently, and Peltier cooling keeps critical components at ideal temperatures.
- **Reduced Emissions:** Better combustion reduces pollutants, while Peltier cooling lowers thermal stress on parts.

Conclusion

A hybrid cooling system combining **silencer preheating and Peltier cooling** presents a **novel solution for improving fuel efficiency, reducing emissions, and enhancing vehicle performance**. With further research and development, this system can be optimized for practical implementation in modern automobiles, contributing to **sustainable and energy-efficient transportation**.





INSPIRING PAPER CRAFT - A HOBBY

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

The Magic of Paper: A Journey into Creativity and Craft

There is something deeply satisfying about the crisp, familiar feel of an old newspaper. Whether lost in thought, watching TV, or simply seeking a moment of calm, my hands instinctively reach for its pages—rolling, folding, and shaping them into miniature works of art. This seemingly unremarkable material, so easy to manipulate into delicate forms or fine cylindrical rolls, has become my favourite medium for crafting. With a little imagination, even discarded paper can be reborn into something extraordinary.

Origami—the mesmerizing art of transforming a single sheet of paper into intricate forms—has long held a special place in my heart. A few precise folds, and an ordinary page blossoms into a graceful swan, a playful fox, or a delicate butterfly. Each creation carries its own charm, proving that the possibilities of paper are as limitless as the human imagination. It's a form of magic, where a flat surface takes on infinite dimensions, shaped only by patience, vision, and a touch of wonder.

Like many, my journey into paper crafting began with the simple pleasure of folding a boat, setting it afloat, and marvelling at its effortless grace. But curiosity soon pushed me beyond the basics. I found joy in crafting intricate butterflies, detailed dino baskets, and whimsical pop-up greeting cards—each piece a reflection of my evolving love for the art. The greatest reward? The delight on the faces of those who received them, especially my mother, my first and most cherished audience.

As my passion deepened, I ventured beyond traditional folds, embracing the structural possibilities of rolled newspaper tubes. This shift unlocked an entirely new dimension of creativity. One of my proudest achievements is a fully functional dining table, crafted meticulously from rolled newspaper tubes—a testament to the strength and versatility of paper. I have also experimented with flower vases, artistic lamp shades, and even an outdoor swing, proving that paper, when handled with care and precision, can be transformed into something both functional and breathtaking.

The process of paper crafting is not just an artistic endeavour—it is a meditative practice, a lesson in patience, and a testament to the beauty of simplicity. With a keen eye for detail and a spark of creativity, even the most ordinary scraps can be reshaped into extraordinary art. Best of all, this craft comes at almost no cost, proving that true creativity does not rely on expensive materials but on the ability to see potential where others see waste.

As I continue this artistic journey, I look forward to sharing my creations, techniques, and inspirations. 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 Larry Ellison

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

The Success Story of Larry Ellison – Founder of Oracle

Introduction

Larry Ellison, the co-founder of Oracle Corporation, is one of the most influential tech billionaires in the world. His journey from a college dropout to building one of the largest software companies is a testament to determination, innovation, and resilience.

Early Life and Challenges

Born in 1944 in New York City, Ellison was raised by his aunt and uncle in Chicago. He struggled academically, dropping out of both the University of Illinois and the University of Chicago. Despite lacking a formal degree, he had a strong interest in technology and programming.

The Birth of Oracle

In the 1970s, Ellison worked at a tech company where he came across a research paper on relational databases by IBM. Recognizing its potential, he teamed up with two partners and founded **Software Development Laboratories (SDL)** in 1977, which later became **Oracle Corporation**. Their goal was to develop a commercial relational database management system (RDBMS), something IBM had not yet pursued commercially.

Overcoming Challenges

Oracle faced intense competition and financial troubles in its early years. In the 1990s, the company nearly went bankrupt due to accounting mismanagement. However, Ellison's leadership helped the company recover by restructuring and focusing on innovative enterprise solutions.

Massive Growth and Market Dominance

Under Ellison's vision, Oracle expanded its product line, acquired several companies (including Sun Microsystems in 2010), and became a leader in database management, cloud computing, and enterprise software. Today, Oracle serves businesses worldwide, competing with giants like Microsoft and Google.

Personal Life and Legacy

Beyond business, Ellison is known for his lavish lifestyle, including owning Hawaiian Islands, luxury yachts, and investments in sports. However, he is also a philanthropist, donating millions towards medical research and education.

Conclusion

Larry Ellison's success story highlights the power of vision, perseverance, and innovation. From a college dropout with no financial backing to one of the world's richest individuals, his journey is a source of inspiration for entrepreneurs worldwide.

ALUMNI CORNER

My college journey

BY, Alagirisamy N

Mechanical Engineering

May 2013 - May 2017

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 2007 – May 2011) 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 (2010–2011) 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 2011, 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 OCT-DEC 2024

1. Effects of Pre-Injection and Antioxidants in a Diesel Engine Fuelled with Methyl Esters of Waste Cooking Oil Biodiesel

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RESEARCH ARTICLE

Effects of Pre-Injection and Antioxidants in a Diesel Engine Fuelled with Methyl Esters of Waste Cooking Oil Biodiesel

2. Smart agriculture farming using drone automation technology

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Preface: Fourth International Conference on Advances in Manufacturing Technology

Karthikeyan Rajagopal, M.D.Vijayakumar, Kumaresan and Siva Shanmugam
Editor
Proceedings of ICAMT 2022

3. Multi-Objective Optimization of Single Point Incremental Forming of 316L Stainless Steel Using Grey Relational and Principal Component Analyses

Visagan A, Department of Production Technology, Anna University, Chennai, India
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MULTI-OBJECTIVE OPTIMIZATION OF SINGLE POINT INCREMENTAL FORMING OF 316L STAINLESS STEEL USING GREY RELATIONAL AND PRINCIPAL COMPONENT ANALYSES

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Kalaichelvan K. ; Department of Ceramic Technology, Anna University, Chennai, India

4. PORT INJECTION OF DIESEL, BIODIESEL, AND PETROL IN A COMPRESSION IGNITION DIRECT INJECTION DIESEL ENGINE TO MITIGATE NITROGEN OXIDES AND SOOT EMISSIONS

Sendilvelan.S, Dr. M.G.R. Educational and Research Institute

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PORT INJECTION OF DIESEL, BIODIESEL, AND PETROL IN A COMPRESSION IGNITION DIRECT INJECTION DIESEL ENGINE TO MITIGATE NITROGEN OXIDES AND SOOT EMISSIONS

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SYNTHESIS AND PROPERTIES OF MAGNETIC COMPOSITE Fe_3O_4 STABILIZED BY POLYMERS FOR CATALYTIC OXIDATION OF AROMATIC HYDROCARBONS

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ABSTRACT

The present study is aimed at creating catalytic systems based on magnetite (Fe_3O_4) stabilized by polymers (polyvinylpyrrolidone (PVP) and chitosan), for liquid-phase oxidation of organic compounds with gaseous oxygen in order to obtain oxygen-containing compounds that can be used in the production of dyes, synthetic fibers, drugs, and many other petrochemical products. Magnetic composites of Fe_3O_4 stabilized by PVP and chitosan were synthesized by the coprecipitation method. The prepared magnetic composites were studied by physicochemical analysis methods. It was found that surface stabilization with polymers leads to a decrease in the size of magnetite nanocrystallites in nanocomposites. The sizes of the studied composites are less than ~ 10 nm. Mössbauer spectra of the obtained Fe_3O_4, Fe_3O_4/PVP, and Fe_3O_4/chitosan composite catalysts showed the presence of trivalent iron ions in a tetrahedral environment and the presence of Fe^{2+} and Fe^{3+} in an octahedral environment, as well as a doublet spectrum. The possibilities of using magnetite-based composite catalysts for heterogeneous liquid-phase oxidation of para-xylene with oxygen are considered. Based on the analysis of the IR spectra of the final reaction samples, the presence of CH bonds in the aromatic ring and C=C double bonds, as well as valence vibrations of the C=O group of carbonyl compounds and vibrations of the bonds of hydroxyl groups was established. It is shown that the main products of the oxidation reaction of p-xylene are p-toluyl aldehyde and dibutyl phthalate, which can be widely used for basic organic synthesis. The authors concluded that the magnetic composite of the Fe_3O_4/PVP composition can be used to produce oxygen-containing compounds, in particular, toluyl aldehyde and dibutyl phthalate.

Keywords: Oxidation, Catalysts, Aromatic Hydrocarbons, Chitosan, Polyvinylpyrrolidone, P-Xylene.

NON TECHNICAL EVENTS IN OUR UNIVERSITY