i-MACE

3rd International Conference of Innovation in Mechanical & Civil Engineering

(i-MACE 2024)

23rd–24th August 2024

Souvenir

Organized by:

Pimpri Chinchwad College of Engineering (PCCOE), Pune

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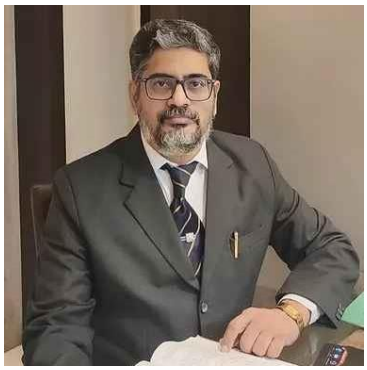
Message from General Chair



Dr. P. R. Kale,
Head of Department and Professor (Mech.),
Pimpri Chinchwad College of Engineering,
Pune.

The conference theme, "Resilient and Adaptive Smart Technologies," is crucial in today's rapidly evolving world, where the need for innovation in Mechanical and Civil Engineering is more pressing than ever. The theme underscores the necessity of developing technologies that can adapt to changing conditions and withstand various challenges, reflecting the broader goals of sustainability and resilience in engineering practices. The General Chair also takes pride in the collaborative spirit of the event, recognizing the contributions of participants, researchers, and partners in making the conference a dynamic platform for exchanging knowledge and driving innovation forward.

- Dr. P. R. Kale,
General Chair, *i-MACE 2024*.

Message from Co - Chair

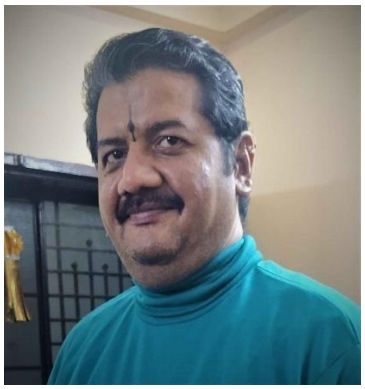
Dr. D. S. Lal,
Associate Professor (Civil),
Pimpri Chinchwad College of Engineering,
Pune.

As we gather for this remarkable event, the focus on "Resilient and Adaptive Smart Technologies" resonates deeply with the challenges and opportunities we face in Mechanical and Civil Engineering today. I am honored to co-chair this conference, which serves as a hub for knowledge exchange and collaboration. Together, our efforts will advance innovation and contribute to sustainable engineering solutions. I extend my gratitude to all participants and organizers for their commitment to making this conference a success.

Warm regards,

- Dr. D. S. Lal,
Conference Co-Chair, i-MACE 2024.

Message from Co - Chair



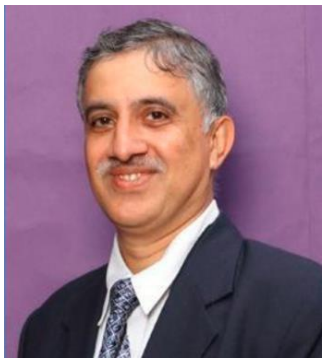
Dr. Laxman V. Awadhani,
Associate Professor (Mech.),
Pimpri Chinchwad College of Engineering,
Pune.

It is a privilege to co-chair this conference, centered on the vital theme of "Resilient and Adaptive Smart Technologies." This focus is more relevant than ever, as we navigate the evolving landscape of Mechanical and Civil Engineering. The conference provides a valuable opportunity for all of us to share insights, foster innovation, and collectively shape the future of sustainable technologies. I am deeply appreciative of the hard work and dedication of everyone involved in making this event a platform for growth and collaboration.

With sincere thanks,

- Dr. Laxman V. Awadhani,
Conference Co-Chair, *i-MACE 2024*.

Chief Guest



Prof. (Dr.) Sunil Bhagwat Director,
Indian Institute of Science Education and Research (IISER), Pune.

Dear Delegates, Guests, and Participants,

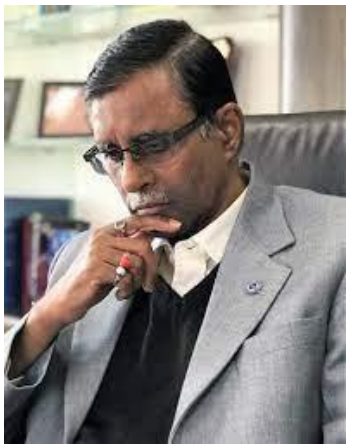
It is an honor to join you at this conference focused on "Resilient and Adaptive Smart Technologies." In a rapidly changing world, the role of Mechanical and Civil Engineering in creating sustainable, adaptable solutions is vital. This event is a powerful testament to our collective commitment to innovation and resilience.

I am inspired by the dedication and creativity of everyone involved. The ideas and research shared here will undoubtedly shape the future, driving new solutions to today's challenges. My gratitude goes to the organizers, participants, and partners for making this event a dynamic space for progress.

Wishing you a successful and impactful conference.

Warm regards,

Guest of Honour



Dr. Pradeep Kumar Sinha,
Founding Vice Chancellor and Director,
Indian Institutes of Information
Technology (IIIT) Naya Raipur

Dear Participants,

I am delighted to be here today at this conference on "Resilient and Adaptive Smart Technologies." In the face of global challenges, the innovations in Mechanical and Civil Engineering presented here are critical to building a more sustainable and adaptable future.

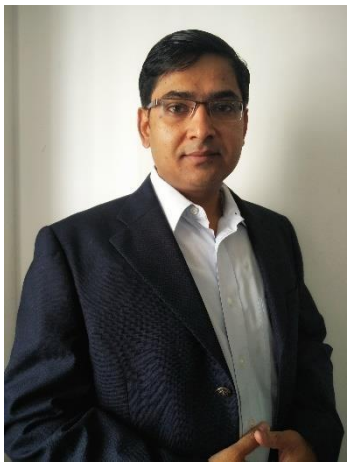
This conference is a testament to the power of collaboration and the pursuit of excellence in engineering. I commend all the participants, researchers, and organizers for their dedication to advancing knowledge and solutions that will have a lasting impact.

Thank you, and I wish you all a productive and inspiring conference.

Wishing you a successful and impactful conference.

Warm regards,

Plenary Speaker



1. Mr. Girish Bora,

Director, Capgemini Engineering, Pune.

2. Dr. Jayatheja M.,

Post Doctoral Research Fellow,

Indian Institute of Technology, Dharwad, Karnataka.

Conference Committee

Mechanical Department		
Dr. Padmakar A. Deshmukh	Mr. Sagar R. Wankhede	Mr. Jitendra D. Ganeshkar
Dr. Narendra R. Deore	Mrs. Rita S. Pimpalkar	Mr. Nilesh V. Gaikwad
Dr. Shitalkumar A. Rawandale	Mr. Vikram K. Aher	Mr. Gaffar G. Momin
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Mr. S. B. Gorade	Mr. S. D. Kurhade	Ms. A. A. Chandragade
Dr. P. R. Mali		

i-MACE 2024 Programme Schedule

i-MACE 2024 DAY 1: 23rd August 2024

8.45 AM to 9.45 AM	Registration: Fluid Mechanics Lab, Building No. 9
9.00 AM to 9.45 AM	Breakfast: Ground Floor, Architecture Building
10.00 AM to 10.10 AM	Inauguration Function: PCET Auditorium (Lamp Lighting, Saraswati Vandana & Felicitation of Guests)
10.10 AM to 10.15 AM	Welcome Address: Dr. Govind N. Kulkarni, Director, PCCoE
10.15 AM to 10.25 AM	General Chair Address
10.25 AM to 10.30 AM	Souvenir Release by Dignitaries and Guests
10.30 AM to 10.45 AM	Guest of Honor Address
10.45 AM to 11.10 AM	Chief Guest Address:, Prof. (Dr.) Sunil Bhagwat Director, IISER, Pune
11.10 AM to 11.15 AM	Vote of Thanks by Dr. Deepti Khurge, TPC, ICCUBEA
11.15 AM to 11.20 AM	Important Instructions to Presenters/Attendees: Dr. Avinash Bhute, TPC, ICCUBEA
10.00 AM to 1.30 PM	Session 1 (Paper Presentations)
1.00 PM to 2.00 PM	Lunch
2.00 PM to 2.45 PM	Plenary session I: Mr. Girish Bora
3.30 PM to 3.45 PM	Tea Break
3.45 PM to 5.00 PM	Session 2 (Paper Presentations)

i-MACE 2024 DAY 2: 24th August 2024

09.00 AM to 09.45 AM	Breakfast: Ground Floor, Architecture Building
09.00 AM to 12.00 PM	Session 3 (Paper Presentations)
12.00 PM to 12.45 PM	Special Session: "From Centralized Control to Distributed Ownership The Evolution of IP in Web3" Anton von Hunerbein, Kalindi Sanghrajka, DAOStreet, California
1.00 PM to 2.00 PM	Lunch
1.00 PM to 3.00 PM	Session 4 (Paper Presentations)
3.00 PM to 3.30 PM	Tea Break
3.30 PM to 5.00 PM	Valedictory
	3.45: Welcome and Felicitation of Guest
	4.00: Conference Briefing by ICCUBEA and i-MACE- TPC
	4.15: IEEE Pune Section: Mr. Abhijeet Kurpe, Secretary
	4.20: Chief Guest Address: Prof. Sunil Bhirud, Vice Chancellor, COEP Technological University, Pune
	4.50: Baton Handover Ceremony to ICCUBEA 2025 and i-MACE 2025 General Chairs
	4.50: Vote of Thanks by Dr. L. V. Awadhani, Co-General Chair, i-MACE-2024
	5.00: Closure

Abstract

TRACK M1 **PAPER ID 26**

A Comprehensive Review on Heart Disease Segmentation and Classification using 3D Reconstruction CT Image

Kumarsagar M. Dange[1] Shubhangi B. Patil[2]

[1]PhD Scholar, Department of Technology Shivaji University Kolhapur. [2] Principal Dr. J J Magdum College of Engineering, Jaysingpur

ABSTRACT

Heart disease remains a significant global health concern, with mortality and morbidity rates continuing to rise. Precise segmentation and categorization of cardiac structures from 3D reconstruction CT images are crucial for accurate diagnosis, therapy planning, and patient care. This review paper delves into various approaches employed for segmentation and classification of heart disease using 3D reconstruction CT images. It provides a comprehensive examination of current advancements in the field, addressing different methodologies, challenges encountered, and prospective avenues for future research. By synthesizing existing knowledge and highlighting emerging trends, this paper aims to contribute to the ongoing efforts in improving the diagnosis and management of heart disease, ultimately aiding in reducing its burden on public health worldwide

Keywords: Heart disease, Segmentation, 3D reconstruction, Deep learning, Optimization techniques, Machine learning

TRACK M1 **PAPER ID 30**

Creating, analyzing, and implementing an automatic feature extraction method for prismatic part

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Kishor Kale (Dept. of Mechanical Engineering, Dr. Vithalrao Vikhe Patil College of Engineering, Ahmednagar, Savitribai Phule Pune University, Pune Maharashtra, India – 414111) <kishorkale.iisc@gmail.com>
Ravi Kumar Gupta (National Institute of Technical Teachers' Training and Research, Bhopal) <rkgupta@nitttrbpl.ac.in>
Rutuja Patil (Dept. of Mechanical Engineering, Sinhgad College of Engineering,Pune, Savitribai Phule Pune University, Pune, Maharashtra, India–411041) <rutuja.deshmukh.scoe@sinhgad.edu>

ABSTRACT

In the manufacturing industry, prismatic parts are widely used due to their geometric simplicity and ease of fabrication. However, designing and optimizing these parts require detailed feature extraction, which is often a time-consuming and manual process. This paper proposes an automatic feature extraction method for prismatic parts, leveraging advanced machine learning and data processing techniques. The goal is to streamline the design process, enhance precision, and reduce human intervention. In general, the designer will design product as per his logic with some constraints, assumptions, etc. and manufacturer will manufacture according to his logic with some manipulation in the data this leads to generation in gap between designers thinking and manufacturers thinking. In current scenario there is no direct control of designer on the manufacturing process parameters. The relation between designer and manufacturer is co-related in such a way that whatever is in the designer's mind will reflect same in manufacturing. So, designer itself will control the manufacturing where as in current scenario there is no control of designer on the manufacturing process. Thus, there will be direct control of designer on process parameters. Due to this there will be less interface of human being while manufacturing the product, so reduction in product manufacturing errors, product manufacturing time and product launching time. The paper focuses on a new methodology for automatic part feature extraction for prismatic part. Prismatic part was created by using SolidWorks package. Principal component analysis (PCA) technique is used to obtain important features of prismatic parts. Automated feature extraction uses specially designed algorithms to extract features automatically from signals without involvement of human.

Keywords: Keywords: SolidWorks, Prismatic part, Feature extraction, PCA, C++, algorithm.

TRACK M1 **PAPER ID 63**

Design and Analysis of Crane Hook with Trapezoidal Cross-Section: A Study on Static Structural and Modal Analysis

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ABSTRACT

In material handling equipment, crane hooks are essential parts that must withstand varying loading conditions while in use. The performance characteristics of crane hooks made of different materials are thoroughly examined in this work. Total deformation and equivalent stress under operating loads are evaluated by the use of Finite Element Analysis (FEA). The research technique includes the use of industry-standard FEA software packages like ANSYS for finite element meshing and simulation after creating 3D models of crane hooks using SolidWorks (CAD) software. To model operational stresses, a variety of loading scenarios that closely resemble real-world circumstances are used, and material parameters like yield strength, and modulus of elasticity are taken into account. Through systematic analysis and comparison, this study evaluates the total deformation and equivalent stress distributions across crane hooks with a trapezoidal cross-section with the material assigned AISI 1040, AISI 4140 and Stainless Steel (SS316). The Hooks with different materials were loaded at loads of 20 kN, 35 kN and 50 kN to check the effect of load on each material. The influence of material properties, and hook geometry on deformation and stress distribution is examined to determine the material better for application of crane hooks. Also, Modal analysis was conducted to determine deformation at a specific frequency. Analysis reveals insights into deformation and stress distribution, helping material selection and design optimization of Hook. Findings contribute to enhancing safety and efficiency in the design process of trapezoidal cross-sectional hooks.

Keywords: Crane Hook, FEA, ANSYS, Modal Analysis, Deformation, Stress

TRACK M1 **PAPER ID 65**

Virtual Drop Test Analysis of Corrugated Box Packaging for Material Handling

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ABSTRACT

This research paper investigates the impact behaviour of corrugated boxes through drop tests, employing the 3DExperience platform for modeling and simulation. Various thicknesses of corrugated boxes (1 mm, 2 mm, 4 mm, and 6 mm) are analyzed by dropping them from a height of 1 m. The Structural Package app is utilized for model creation, while pre-processing is conducted using Structural Model Creation and Mechanical Scenario Creation apps. The study incorporates wood and aluminium blocks within the box for testing, considering their respective yield strengths. Additionally, to accurately represent the material properties, composite modeling techniques are employed. This study aims to enrich our understanding of corrugated board behaviour under impact conditions and optimize its design for enhanced mechanical performance. Adding thickness to a component can indeed help reduce stress during a drop test, but it's not the only factor to consider. Increasing thickness can distribute forces more evenly and provide greater structural integrity, thereby reducing stress concentrations. However, other design features, such as changing material properties, can also play a significant role in stress reduction. It's essential to analyze the specific requirements and constraints of the drop test scenario to determine the most effective design modifications. The observed increase in stress levels with thickness underscores the importance of considering material properties, stress concentrations, impact response, structural integrity, and design optimization strategies in developing robust and reliable components for drop test applications.

Keywords: Corrugated box design, material handling, drop test, FEA, composite modeling

TRACK M1 **PAPER ID 66**

Analysis of Lifting Eye Bolt for Different Materials and Cross Sections

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ABSTRACT

This study examines the performance of lifting eye bolts with varied geometries and engineering material compositions. The aim of the study is to examine the lifting eye bolt's deformation levels and maximum and minimum stress conditions when subjected to a 500 kg load. A 3D model of the lifting eye bolt is generated using Creo software. Ansys Workbench is utilized to perform Finite Element Analysis (FEA) in order to assess the stresses, deformations, and cross section in various materials and geometries. Based on the findings, it is evident that trapezoidal cross section of eye bolt consistently exhibits reduced stress and deformation in comparison to ring cross section of eye bolt. This suggests that the trapezoidal shape for eye bolt is preferable for lifting eye bolts to maximize safety and efficiency.

Keywords: Lifting eye bolt, stress condition, different materials, Ansys workbench, deformation

TRACK M1 **PAPER ID 79**

Experimental Studies on Surface Roughness of Spur Gear

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ABSTRACT

Spur gears are used as a convenient way to transfer motion and power between shafts. One of the critical characteristics of spur gears is their surface roughness which affects their performance and durability. Proper hobbing techniques improve surface roughness, resulting in smoother operation and longer gear life. Hence, optimizing the hobbing processes during its manufacturing is an important step in achieving increased profitability and customer satisfaction. This paper investigates surface roughness of spur gear hobbing processes at various Taguchi levels, focusing on cutting speed and feed rate. The findings of the study revealed that Taguchi Grey Relational Analysis is an effective method for optimizing the hobbing process and reducing surface roughness. The best results for the process can be obtained at a cutting speed of 400 rpm, feed rate of 8 mm/min, and a single depth of cut of 3.91 mm .The research will contribute to the broader manufacturing field by inspiring further investigations into related processes and technologies.

Keywords: Gear Hobbing; Surface Roughness; Spur Gear; Taguchi-Grey Relational Analysis; Manufacturing Processes

TRACK M1 **PAPER ID 86**

Fault Detection In Deep Groove Ball Bearing Using Haar Wavelet Transform

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ABSTRACT

The application of advanced signal processing techniques is critical in machinery condition monitoring and fault detection. This study provides a detailed examination of the Haar Wavelet Transform (HWT) and Short-Time Fourier Transform (STFT) methodologies for accurately identifying faults in Deep Groove Ball Bearings (DGBBs). Data acquisition was performed using the RT Photon DAQ system in conjunction with an accelerometer, capturing signals from four bearing conditions: Healthy, Inner Race Fault, Outer Race Fault, and Ball Fault. Initially, time-domain analysis was conducted, calculating metrics such as Kurtosis, Skewness, and Variance to discern signal variations. Recognizing the limitations of time-domain analysis in fault detection complexity, frequency-domain analysis was also performed. Using MATLAB, the signals were decomposed via HWT up to five levels, revealing distinctive coefficients. These coefficients, plotted as Power Spectral Densities, visually differentiated fault conditions. Statistical validation of these distinctions was achieved through Analysis of Variance (ANOVA). The study further explored frequency-domain parameters, specifically Ball Pass Frequency Inner (BPFI), Ball Pass Frequency Outer (BPFO), and Ball Pass Frequency Roller (BPRF). In addition to HWT analysis, the STFT method was employed, generating spectrograms from the signals. These spectrograms facilitated fault identification at characteristic frequencies within the DGBBs. In summary, this research offers a comprehensive methodology for fault detection in DGBBs using HWT and STFT techniques. Both methods proved effective in signal processing, demonstrating high accuracy and computational efficiency. This dual approach enhances the reliability of machinery condition monitoring systems.

Keywords: Wavelet Transform, Short Time Fourier Transform, Deep Groove Ball bearings, MATLAB, Power Spectral Density

TRACK M1 **PAPER ID 89**

Numerical Analysis of the Side View Mirror of the Vehicle Subject to Random Vibration

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ABSTRACT

This study presents a comprehensive numerical analysis of a side view mirror assembly subjected to both natural frequency and random vibration conditions. The importance of side view mirrors in vehicle safety is underscored, emphasizing their role in enhancing driver visibility and minimizing blind spots. Random vibration, a stochastic phenomenon arising from various environmental factors, poses challenges to the structural integrity and performance of vehicle components, including side view mirrors. The methodology involves the creation of a simplified 3D CAD model using the 3DExperience platform, with assigned material properties for the mirror casing and glass components. Boundary conditions are defined, including clamped mirror side mount fixation and base motion acceleration applied using Abaqus software. Simulation steps encompass frequency analysis to determine natural frequencies and random vibration analysis to assess structural response under dynamic loading conditions. Results indicate a resonance frequency of model, surpassing criteria suggested by previous studies. The root mean square (RMS) value from random vibration analysis falls within acceptable material property ranges, validating the design's robustness. Collectively, the analyses affirm the efficacy and resilience of the side view mirror design, contributing to enhanced vehicle safety and performance. Overall, the study provides confidence in the design's suitability for integration into vehicle systems, promoting safety and functionality on the road.

Keywords: Side view mirror, numerical analysis, natural frequency, random vibration, vehicle safety

TRACK M1 **PAPER ID 91**

Bead Pattern Optimization for Sheetmetal Panel using 3DExperience Platform

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ABSTRACT

The significance of this research lies in its relevance to the automobile industry, particularly in the context of electric vehicles (EVs), where the demand for lightweight yet robust components is paramount to enhance efficiency and ensure safety standards. By employing sophisticated bead pattern optimization techniques, this study aims to markedly enhance the structural performance of battery cover panels, thus contributing to the production of more dependable and enduring vehicles. This research presents a pioneering approach to fortify the structural integrity of battery cover panels in four-wheeler EVs through meticulous bead pattern optimization. Leveraging the advanced capabilities of the 3DExperience platform, this study facilitates the creation of intricate model geometries and facilitates comprehensive simulation studies. The primary objective of this optimization process is to maximize the minimum frequency of the component, consequently bolstering its structural resilience and longevity. The methodology entails an exhaustive exploration of various bead patterns and the execution of parametric design studies to ascertain the most optimal configuration. Through iterative simulations and meticulous analyses, the study strives to achieve a pragmatic solution that maintains structural robustness while ensuring minimal impact on weight and manufacturing feasibility. Furthermore, this research offers practical design guidelines and proposes an optimal bead design method to address the inherent deficiencies in plane sheet panels, which typically exhibit poor stiffness and vibration performance due to their flexibility. In the automotive industry, the addition of beads to sheet panels is a common and cost-effective approach to improve stiffness and vibration performance.

Keywords: Bead pattern optimization, Structural performance,3DExperience platform, Automobile industry, Lightweight design, Minimum frequency maximization, Parametric design study, Finite element analysis (FEA)

TRACK M1 **PAPER ID 100**

Design And Structural Analysis of Jib Crane Boom Using Composite Material

Kalpesh Shete (Pimpri Chinchwad College of engineering)
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Nallu Vivekanandan (PCCOE) <n.vivekanandan@pccoepune.org>

ABSTRACT

The utilization of composite materials in the design and construction of crane booms has gained considerable attention due to their advantageous mechanical properties and potential for weight reduction. This thesis presents a detailed investigation into the design and structural analysis of a JIB crane boom fabricated using composite materials, specifically focusing on glass fiber and carbon fiber composites. Findings of this research contribute significantly to the advancement of composite materials in crane boom applications. By combining theoretical calculations with practical simulations, this study offers a comprehensive understanding of the structural behavior and performance of composite crane booms. Moreover, the comparative analysis between glass fiber and carbon fiber composites provides valuable insights into material selection considerations for optimal boom design. In addition to the technical aspects, this thesis also addresses the economic feasibility of manufacturing composite crane booms. A detailed cost analysis was conducted, considering factors such as material costs, manufacturing processes and Power consumption. The resulting cost evaluation provides valuable information for decision-making processes in the fabrication of composite crane booms, highlighting the potential economic benefits of utilizing advanced materials and manufacturing techniques.

Keywords: Carbon Fiber, JIB crane boom, Structural Analysis, Glass Fiber, Deflection, Finite Element Analysis (FEA), Weight Reduction, Power Consumption, Cost Analysis.

TRACK M1 **PAPER ID 100**

Design And Structural Analysis of Jib Crane Boom Using Composite Material

Kalpesh Shete (Pimpri Chinchwad College of engineering)
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Nallu Vivekanandan (PCCOE) <n.vivekanandan@pccoepune.org>

ABSTRACT

The utilization of composite materials in the design and construction of crane booms has gained considerable attention due to their advantageous mechanical properties and potential for weight reduction. This thesis presents a detailed investigation into the design and structural analysis of a JIB crane boom fabricated using composite materials, specifically focusing on glass fiber and carbon fiber composites. Findings of this research contribute significantly to the advancement of composite materials in crane boom applications. By combining theoretical calculations with practical simulations, this study offers a comprehensive understanding of the structural behavior and performance of composite crane booms. Moreover, the comparative analysis between glass fiber and carbon fiber composites provides valuable insights into material selection considerations for optimal boom design. In addition to the technical aspects, this thesis also addresses the economic feasibility of manufacturing composite crane booms. A detailed cost analysis was conducted, considering factors such as material costs, manufacturing processes and Power consumption. The resulting cost evaluation provides valuable information for decision-making processes in the fabrication of composite crane booms, highlighting the potential economic benefits of utilizing advanced materials and manufacturing techniques.

Keywords: Carbon Fiber, JIB crane boom, Structural Analysis, Glass Fiber, Deflection, Finite Element Analysis (FEA), Weight Reduction, Power Consumption, Cost Analysis.

TRACK M7 **PAPER ID 69**

Proposed new product development (NPD) process framework for automobile industry

Balasaheb Shinde (MIT Art, Design and Technology University)

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ABSTRACT

The Indian manufacturing industry, specifically the automobile, has become more competitive. The automobile sector in India is a significant driver of macroeconomic growth and technological advancement. The development of competitive new products is a prerequisite for automobile industry. Hence, many manufacturing organizations in automobile strongly advocate for an intensified emphasis on New Product Development (NPD) process to stay competitive amid the rapid advancements in technology and ever increasing global competition. NPD processes are getting increasingly complex due to today's globalized market and customers desire for technologically advanced products. The process of developing new products is complex, involving number of factors that converge to decide the success or failure of a venture. A well-defined and proven NPD framework, effective communication, data management and knowledge management are some challenges of new product development in 21st century. Literature shows that NPD with improper process, particularly within the automobile industry, will result in poor quality, costly and late delivery of a product to market. A comprehensive, tailor-made new product development (NPD) process framework specifically designed for the automobile sector is not currently found in existing literature. Among the various NPD process frameworks available, the Stage Gate framework created by Cooper stands out as the most efficient model in India, particularly within the automobile industry. This research proposed a new NPD process framework specially designed for India's automobile sector to enhance the new product development performance of medium and small-scale industries.

Keywords: Stage-Gate System; New product development (NPD); New product development process framework

TRACK M2 **PAPER ID 3**

Life Cycle Analysis of Steel, Glass Fibre Polymer Rebar and Basalt Rebar

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ABSTRACT

The inclusion and usage of steel in construction has been a major game changer for the industry whether it is in the form of reinforcing steel used in various low- or high-rise buildings or in the form of structural steel used for different kinds of channel or beam sections. This heavy usage and dependency of the industry solely on the product has led to some harmful effects on the environment. This study is thus a means of finding an alternate or a substitute that may have a minimalistic impact on the environment and to find how many the alternate fares in terms of performance, durability and the most important factor v.i.z. the cost. To accomplish this, Life Cycle Assessment (LCA) is done so as to survey the natural effects that a specific item as during its production, utilization and the removal stage. Also, Life Cycle Cost Assessment (LCCA) is done which helps in determining the relevance of additional costs which puts an adverse impact.

Keywords: Fibre Composite Rebar, Eco Balance, Cradle-to-Grave, Glass Fibre Reinforced Polymer (GFRP).

TRACK M2 **PAPER ID 5**

Review on Thermal Analysis of Laminated Plates and Beams

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ABSTRACT

Laminated composites possess extra ordinary properties like high strength and prominent shear strength in transverse direction. These properties play a key role for the reasonably thick and also for thin laminates. Laminated plates and beams are analyzed in the past by various researchers. Different theories are adopted by various researchers for analyzing composites in the domain of temperature. In this article it is tried to scrutinize the studies dealing with laminates subjected to thermal loadings. Also it is tried to highlight the displacement fields adopted by the researchers. It is observed that while assessing the flexural behavior of laminated composite beams many researchers have neglected the transverse normal deformation. This results in the deviation from the exact solutions. It is also noted that trigonometric deformation theory is not yet applied to laminated and sandwich beams subjected to thermal load with due consideration of transverse normal deformation effect.

Keywords: Laminated; Analysis; Composites; Thermal.

TRACK M2 **PAPER ID 51**

Flow Stresses in a hollow disc of Al 6063 subjected to various interfacial conditions

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ABSTRACT

Forging is an operation of deforming the material to required shape. The forged part will have the grain refinement and good surface finish. Sometimes, especially in cold forming, the finishing operations may not be required further machining. The amount of load applied, rate of deformation, and the surface conditions between the die and workpiece decides the filling of die without any defects in the deformed components. Here, an attempt has been made to quantitively analyze the prevailing frictional conditions in Al 6063 hallow disc using Castor oil, Grease and Dry lubrication conditions for dependent flow stress analysis

Keywords: Hollow disc, Ring Compression test (RCT), Friction coefficient, Bulk Deformation.

TRACK M2 **PAPER ID 6**

Water Powered Vehicle

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ABSTRACT

India towards a bright future. Considering the increasing air pollution in our country and the increasing fuel prices every day, we have try to do something different from the rest of the companies as a solution to overcome such big problems. A different vehicle has been made considering the environment and the future. This vehicle runs on water and without releasing Carbon this vehicle releases Oxygen gas. This vehicle also gives good mileage, it can run above 55km on 1 liter of water. This is very good because the cost of water is very low while the cost of petrol and diesel is high, and this vehicle will not cause any harm to the environment. This vehicle produces less noise pollution than a fuel-efficient vehicle, and it does not produces air pollution. This vehicle can carry the same weight as a fuel powered vehicle carry. This vehicle can contribute to the progress of our country.

Keywords: Hydrogen fuel cell, Hydrogen-powered vehicles, Electrolysis of water, Fuel cell electric vehicle (FCEV), Zero-emission vehicles, Renewable energy, Sustainable transportation, Hydrogen storage solutions, Environmental impact, Clean energy vehicles, Alternative fuel vehicles, Hydrogen production methods, Energy efficiency

TRACK M2 **PAPER ID 94**

Optimization of Injection Molding Process Parameters to Minimize Warpage in Set for Set Top Box Components Using Taguchi L8 Orthogonal Array and ANOVA

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ABSTRACT

This research focusses on optimising injection moulding process parameters to reduce defects like warpage and short shots in the production of Set Top Box components. Six key parameters were studied using the Design of Experiments (DoE) approach, specifically the Taguchi method with a L8 orthogonal array: flow rate, melt temperature, mould temperature, holding pressure, gate diameter, and runner diameter. The analysis entailed performing an Analysis of Variance (ANOVA) to determine the statistical significance and relative impact of each parameter on the identified defects. The findings show that melt temperature, mould temperature, and holding pressure are the most important factors influencing warpage, with melt temperature accounting for 48.08% of the total variation. Mould temperature and holding pressure accounted for 21.37% and 6.90%, respectively. The study concludes that optimising melt temperature, mould temperature, and holding pressure is critical for reducing warpage and short shots, and thus improving the quality and dimensional stability of injection moulded components. The research findings provide practical guidelines for the injection moulding industry, allowing for improved product quality and manufacturing efficiency. This study advances our understanding of injection moulding process optimisation and lays the groundwork for future research aimed at refining these processes.

Keywords: Injection Molding, Taguchi DOE, ANOVA, Warpage, Process Optimization, Set Top Box Components.

TRACK M4 & M5 **PAPER ID 15**

Enhancing Efficiency through the Design, Development, and Analysis of a Novel Stroke Adjustor Mechanism in Variable Displacement Pumps

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ABSTRACT

This paper gives a brief of the innovation that entails the designing, development, and analysis of a stroke adjuster mechanism for a variable displacement pump. The inefficiencies associated with invariable displacement in conventional hydraulic systems present certain operational limits, which in turn lead to the wastage of energy. Our approach introduces a novel linkage mechanism that varies in stroke length to adapt fluid output based on the real-time requirements, enhancing operational flexibility and system efficiency. The central part of the design is an eccentric mounting slotted crank link to the piston, which allows adjustable stroke lengths between 0 - 7mm. This directly corresponds with the volumetric output between 0 - 0.791784cc per stroke. This mechanism is very crucial, since it overcomes all the drawbacks of the traditional ones by providing accurate control of the discharged volume and cutting down the operation energy consumption and costs. Comprehensive analysis through the use of ANSYS Workbench 2023 R1 simulation helped in determining the mechanical integrity of the design under variable operational conditions. Experimental testing focused on the pump's volumetric efficiency at different speeds (200 to 600 rpm) and stroke settings. It showed that the volumetric efficiency is at its peak value of 400 rpm and equals 78.55%. Such maximum performance brings out the human ability of the adjuster to minimize internal leakages and inefficiencies that come with higher speeds. The flexibility of the design was also reflected from the comparative study of theoretical and actual flow rates that came relatively close, proving the accuracy of our predictive models. The stroke adjuster mechanism serves to adjust the variable flow rates in industrial applications; it also ensures appreciable improvements in energy efficiency and operational safety, hence being a pretty valuable addition to modern hydraulic systems.

Keywords: Variable Displacement Pump, Stroke Adjuster Mechanism, Slotted Crank Link, Energy Efficiency, Volumetric Efficiency

TRACK M4 & M5 **PAPER ID 80**

Air Core Generator for Savonius type wind turbine for electricity generation

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ABSTRACT

Wind turbines can be utilized in water turbines, harnessing the power of flowing water to generate electricity. Moreover, wind turbines can even generate electricity through rotation, providing an alternative power source in certain scenarios and can be used long-term sustainability. Wind turbines can serve as a consistent and reliable power resource, contributing to a more stable energy supply. In the paper design and development of Air core generator for Savonius type wind turbine with were presented to overcome the problem of normal wind turbine (star or delta type of generators) that operated on certain torque and at certain specified high wind speed. Experimentation were carried out for different wind speed. The range of power values obtained, ranging from 0.5 watt to 57.7 watts for within the velocity range of 2 m/s to 8 m/s, respectively, which highlights the significant variation in power as a function of velocity or speed.

Keywords: Savonius turbine; Wind Turbine; Core generator; electromotive force.

TRACK M4 & M5 **PAPER ID 92**

Enhancement of The Performance of Conventional Solar Water Still By Applying Evapourative Condenser, Coupling with Flat Plate Collector & Front Wall Internal Reflector

ABSTRACT

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In arid and semi-arid regions, the challenge of accessing potable water is often compounded by high solar radiation. This issue is particularly acute in remote rural areas with minimal infrastructure and no connection to an electrical grid. In such contexts, small-scale, stand-alone desalination systems capable of converting brackish water from wells or seawater into clean drinking water are highly desirable. Many rural communities suffer from consuming water from deep wells contaminated with arsenic, and traditional desalination methods are impractical in these decentralized regions due to their high maintenance requirements, dependence on infrastructure, and associated costs. To address these challenges, integrating a flat plate collector with a conventional solar still has been shown to enhance the output of desalinated water. Studies have demonstrated that incorporating an internal condenser within the traditional basin of a solar still can improve its productivity by up to 24%. Thus, small-scale solar desalination systems are both practical and economically viable for these communities. The operation of solar thermal devices in natural circulation mode offers several advantages over forced circulation, including simplicity, reliability, and cost-effectiveness. Consequently, a model has been developed for a solar distillation system that includes a single basin solar still coupled with a flat plate collector, side wall evaporative condensers, and a front wall internal reflector. This configuration has significantly improved the system's productivity. Experimental results indicate that this setup can produce 12.3 liters of water per day, achieving an efficiency of 42.6%.

Keywords: Solar Energy, Solar Still, Flat-Plate Collector, Internal Condenser, Front Reflector.

TRACK M4 & M5 **PAPER ID 93**

Numerical Simulation of Micro Wind Turbine for low speed application

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ABSTRACT

The primary objective of this work is to utilize numerical modeling techniques to optimize the performance of a micro wind turbine specifically built for low-speed applications. A meticulous 3D model of the turbine blade was created and examined using Computational Fluid Dynamics (CFD). The methodology involved generating a precise fluid domain, carrying out a thorough meshing process, and completing a grid independent study to assure the accuracy of the solution. The simulations were conducted using several blade radii, specifically 200 mm, 220 mm, 240 mm, and 260 mm, in order to assess their effects on power generation and turbine speed. The results showed that increasing the size of the blade radius had a substantial impact on power generation, with the 260 mm radius achieving the highest power output. The increased efficiency of the turbine in low-speed wind conditions commonly found in metropolitan areas is due to its greater swept area, which allows it to absorb more wind energy. Nevertheless, greater blade radii led to decreased rotational speeds as a consequence of heightened inertia, hence alleviating mechanical strain and diminishing levels of noise and vibration. The 260 mm blade radius is the optimum choice for low-speed wind applications because to its ability to efficiently gather power while minimizing mechanical stress.

Keywords: Micro Wind Turbine, Computational Fluid Dynamics (CFD), Power Generation, Turbine Speed

TRACK M6 & M8 **PAPER ID 8**

Solving documentation process using project management principles

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ABSTRACT

The Supplier Initiated Change Request (SICR) process plays a crucial role in organizational operations, facilitating timely adjustments and enhancements. However, recurring errors in the completion of SICR Forms by suppliers have impeded efficiency, prompting the need for targeted intervention. This paper delves into the experiences of the SICR Process Coordinator in addressing this challenge through a systematic approach guided by project management principles. By assembling a dedicated team and employing the stages of Forming, Storming, Norming, Performing, and Adjourning, the root causes of supplier errors were identified, and corrective measures were implemented to streamline the process. Additionally, the integration of RACI and stakeholder matrices helped delineate roles and foster stakeholder engagement. The paper offers insights into the methodologies employed, challenges encountered, and outcomes achieved, emphasizing the importance of proactive process management and stakeholder collaboration in enhancing organizational efficiency.

Keywords: RACI, Stakeholder matrix, Tuckman model, team development, supplier, communication, process simplification

TRACK M6 & M8 **PAPER ID 49**

Investigation on effect of heat treatment (T6) on microstructure and mechanical properties of Al7075-SiC composites

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ABSTRACT

This research objective is mainly to investigate the effect of T6 tempering on microstructure of Al 7075-SiC composite. The microstructure is determined by using field emission scanning electron microscopy (FESEM). As well as to investigate the mechanical properties on the effect of Al 7075-SiC composite. This experiment will consist of 4 sample that will go through FSP after compacting SiC powder into the Al 7075 plate, then the specimen will be cut using wire cut EDM for tensile test sample and wear sample for FESEM. Afterward the sample will go through solution heat treatment and will heated for 1 hour then will be water quench to a cool room temperature. Again, the sample will be heated for 6-hour aging and three sample will be heated with a different aging temperature. The wear sample is to be prepared for mounting, grinding and polishing. The FESEM result shows there's and interfacial bonding, the grain size and precipitation also increase. The tensile test results showed the improvement of ultimate tensile strength (UTS) on sample that has been heat treated compared to the non-heat treated. The maximum UTS of 317.461 MPa is achieved for 80℃ ageing composite. The non heat-treated sample shows the lowest UTS.

Keywords: Composites, Friction Stir Processing, Aluminium, Silicon Carbide

TRACK M6 & M8 **PAPER ID 75**

Integration of lean manufacturing system with novel intuitive fuzzy syncretic lean frame work to improve the overall equipment effectiveness

ABSTRACT

Lean manufacturing embraces the principle of doing more with less by removing non-value-added activities from manufacturing processes to preserve effectiveness, flexibility, and profitability. Predictive maintenance in production stages are more critical since it involves machines which are prone to failure and a post failure maintenance stagnates the production which creates bottlenecks due to machine failures. Hence in this work a novel intuitive fuzzy syncretic lean frame work has been implemented to incorporate the need of intelligent systems. The framework is divided into phases which employs Fuzzy logic with embedded smart sensors for effective utilization of man machine and materials in order to improve the effectiveness of a production floor. A novel time based forecasting is done in the design phase which implements the lean tool Takt time. The manufacturing phase uses the sensors to determine the predictive maintenance of the machines thereby implementing continuous flow as the lean tool and the inspection phase uses smart sensor system for real time continuous monitoring of the machining process thereby incorporating Poka-yoke as a lean tool. Thus by implementing the framework the overall equipment effectiveness is achieved which helps in achieving continuous flow of products and defect free products in any production firm.

Keywords: Lean manufacturing, Automation, Embedded sensors, Takt time, Continuous flow, Poka-yoke.

TRACK M6 & M8 **PAPER ID 90**

Drive Cycle-Based Design and Development of Battery Packs for 4-Wheeler Electric Vehicle

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ABSTRACT

The need to address global warming and the increasing demand for rare earth fossil fuels has led to the development of alternative technology vehicles. An alternative technology being investigated to overcome these limitations is the electric vehicle (EV). The battery and motor are the primary components of an electric vehicle (EV) responsible for generating the required power output. This article mostly addressed the process of choosing battery technology and appropriate packaging for a small-sized car. An exhaustive examination of the latest battery research and solutions used in commercial vehicles was conducted, along with a literature study. The main objective in the development of a groundbreaking battery package was the selection of the car. The vehicle selection procedure prioritized battery pack modularity and scalability, while also considering several contemporary automotive designs. A battery package conceptual model was developed with the selected vehicle. The article describes the battery module's design, which optimizes power density and is cost-effective. A comprehensive specification document was generated, including the system design and key features of the designed electric vehicle (EV). This article discusses the process of designing battery packs for electric four-wheeled vehicles.

Keywords: Electric Vehicle, Electric Motor, Power sizing, Drive Cycle

TRACK M6 & M8 **PAPER ID 96**

A novel study of Zinctitanate nano additives for potential enhancement of antiwear and EP performance of lubricants

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ABSTRACT

The relentless pursuit of environment benign lubricant aspires to lower/replace SAPS compounds (Sulphated Ash, Phosphorus, Sulphur) which negatively impact the emission after-treatment system of automotive vehicles by undermining the catalytic convertors. This novel study explored Zinctitanate ($ZnTiO_3$) nanoparticles (APS <100nm) for potential in lubricant formulation. A series of nano-oils were formulated by varying Zinctitanate nanoparticles concentration (0.25-1 wt.%) along with a commercial dispersant PIBSA (1wt% fixed concentration) in PAO-6 (API group IV) base oil. Antifriction, antiwear, and extreme pressure performance of the formulated nanolubricants were assessed using four ball tribometer. Colloidal stability of the Zinctitanate nanoparticles was studied using DLS analysis and visual inspection at regular intervals. good dispersion stability was observed, which may be credited to excellent physicochemical behaviour of Zinctitanate nanoparticles. All concentrations of Zinctitanate nanoparticles improved tribological performance and the concentration of 1wt% gave excellent antiwear (26%), and antifriction (14%), compared to the neat oil. Further, results of the tribological performance of Zinctitanate nanoparticles outperformed commercial ZDDP additive under similar working conditions. Surface characterization (SEM, EDS) results confirm the generation of sacrificial tribofilm (at least 100nm thick) consisting of ZnO and $FeTiO_3$ due to disintegration under tribostress and tribochemical reaction with the steel surface.

Keywords: Zinctitanate, nanolubricants, AW additives, tribology, colloidal stability, EP additives

TRACK C1 **PAPER ID 4**

Optimizing Workflows in Building Information Modeling: A Comprehensive Revit API Plugin for Generating Element ID, Instance, Type, and Symbol

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ABSTRACT

Building Information Modeling (BIM) has emerged as a fundamental component of the Architecture, Engineering, and Construction (AEC) industry, fostering collaboration and efficiency. Nevertheless, a persistent challenge remains in the efficient retrieval of detailed information regarding elements within BIM tools such as Autodesk Revit. This research introduces a significant approach – a Revit add-in developed to generate Element IDs along with crucial details including family name, type, and instance information of the particular element that is selected in Revit environment. Upon this API the BIM designers can facilitate and accelerating their workflow efficiency through the utilization of such a plugin. Users can promptly extract information in fewer steps, avoiding the complex traditional approaches to accessing desired information within BIM authoring software like Revit. The paper outlines the development process, methodology, and preliminary findings, highlighting the potential of the add-in to streamline BIM workflows and equip professionals with comprehensive project insights. This research contributes to the ongoing dialogue on BIM methodologies by presenting a practical tool to address information retrieval challenges within the Revit environment. The development process of this add-in employs the C# programming language, ensuring a strong foundation for efficient information retrieval. Thorough testing validates the add-in's functionality, accuracy, and user-friendliness. Preliminary results demonstrate the tool's efficacy in promptly delivering comprehensive data, thereby enhancing user experiences and facilitating more informed decision-making within BIM workflows.

Keywords: BIM, REVIT, C#, PLUGINS, ADDINS, API

TRACK C1 **PAPER ID 10**

Study on Consumers Perception towards Extended Producer Responsibility (EPR) with respect to E-waste

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ABSTRACT

The study's objective is to assess the public's understanding of managing e-waste domestically and their familiarity with the Extended Producer Responsibility con-cept after the introduction of the E-waste Management and Handling Rules in In-dia. Given that mobile phones are among the significant contributors to electronic waste in India, the study focuses on this device in particular to meet its objective. The purpose of this research case is to educate both producers and the public re-garding the current mismatch between e-waste generation and collection, and the urgent need for action to prevent the situation from deteriorating further. This case can shed light on how the Government needs to keep a regular check on the implementation of various rules and regulations. It tries to imply as to how the proper compliance to the different policies is more important than merely mandat-ing them. This study examines the extent and implications of Extended Producer Responsibility in relation to the e-waste management in India through question-naires, interviews and secondary data sources like Central and State Government websites, research papers and articles from databases. The result highlights the need for authorities to raise awareness and address the serious nature of the prob-lem among the general public.

Keywords: E-waste, Extended Producer Responsibility (EPR), E-waste Management and Handling Rules.

TRACK C1 **PAPER ID 45**

Water Quality Evaluation of Pawna River using QUAL2E Software

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ABSTRACT

Pune, a rapidly developing hub in Maharashtra, India, is witnessing the establishment of numerous processing industries to meet the region's growing demands and reduce pressure on existing industrial centers. The Pawna River, a major of the Mula-Mutha River, runs in the Pimpri-Chinchwad Municipal Corporation area and serves as the primary water source for the city and its neighboring regions. Over the past decades, various human activities, including industrial operations and unplanned agricultural practices, have significantly impacted the Pawna River's catchment area. The research aims for water superiority assessment of the Pawna River by a QUAL2E model. Samples were collected from various places and analyzed in the laboratory for various parameters. Results indicated that chemical parameters such as pH, alkalinity, hardness, conductivity, and chlorides were in the limits as per prescribe by various boards. The QUAL2E software employed evaluating the consequences of various sources of contamination on various aspects of watercourse. The findings suggest that the water superiority along the Pawna stream remains within acceptable standards, though turbidity levels vary with location.

Keywords: Water Quality, Pawna River, QUAL2E Model, Pollution, Industrial Impact.

TRACK C1 **PAPER ID 57**

Design of Rainwater Harvesting System for Educational Campus

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ABSTRACT

This research paper has designed a rainwater harvesting system forPCET Nigdi Campus, Pune, Maharashtra, India. The objective is to address the issue of water scarcity which is being aggravated by population explosion, global warming and pollution by utilizing local available rainwater for meeting the yearly water demand of the PCET Nigdi Campus. This involved a complete evaluation of existing water resources in the campus as well as detailed calculations on potentiality of rainwater harvesting. This include such things as total catchment area, roof surface runoff coefficients and evaporation losses. These findings show that there exists great potential for rainwater harvesting to meet most of the Campus water requirements. Finally, this project shows the significance of sustainable water management and presents an example that can be copied by going through similar problems with regard to their water usage.

Keywords: Rainwater Harvesting; Water Management; Water Conservation; Sustainable Water Practices.

TRACK C1 **PAPER ID 67**

Seasonal variations and distribution of major ions in the aerosol around a coal-fired thermal power plant

ABSTRACT

This study is concentrated on the seasonal changes in major ions in the aerosols around Udupi Power Corporation Limited (UPCL). Data collected during a one-year period shows that both natural and anthropogenic sources have an impact on the samples. Sea salts from the Arabian Sea and the weathering of silicate rock, or mineral dust, have an impact on aerosol samples, coming from natural sources, whereas contributions from the fly ash of UPCL, vehicular emissions are anthropogenic. The principal component analysis and the thematic maps support this finding. In comparison to the monsoon and early monsoon seasons, anthropogenic activities had a greater influence on the pre-monsoonal and post-monsoonal samples, according to the distance-wise distribution of major ions and the wind backward trajectory study.

Keywords: seasonal variations of major ion concentrations, thematic maps, principal component analysis.

TRACK C1 **PAPER ID 38**

Integrated Watershed Management of Manjara River by Using Geoinformatics

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ABSTRACT

Morphometric parameter of the basin of Manjara Watershed located between Latur district in Maharashtra state, India is carried out by RS and GIS techniques using satellite imageries and topographic maps on a scale map of 1:50000. Manjara watershed has dendritic drainage pattern. The morphometric parameters are discussed about Linear, Aerial and Relief aspect. The drainage density of the study area varies from 2.812 to 2.942 Km/km2 which indicate that Moderate runoff and infiltration rates, reflecting the moderate density of stream channels. Balanced erosion and sediments transport processes. The study of drainage basins and watersheds using morphometric features is crucial to catchment planning. The best method for figuring out the relationships between various components in the watershed. This study explores the significance of the values of the various morphometric parameters with enough contextual knowledge. A rigorous review is conducted on each classification, the range of values, and the implications that follow. In addition to classification and its impacts, the writers are concerned with the quality of input data, both in terms of data preparation and mapping scale and detail level.

Keywords: GIS, Morphometric Parameters, Manjara Basin, Watershed Maangement.

TRACK C3, C4, C5 **PAPER ID 62**

Exploring the Effectiveness of Polypropylene Fiber-reinforced Geo-polymer Concrete

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ABSTRACT

This research explored the effectiveness of polypropylene fibers (PPF) in industrial fly ash (IFA) based geopolymer concrete (GPC). The GPC of M40 grade was incorporated with different PPF capacities (0.2%, 0.4%, and 0.6% by weight of concrete) and assessed its performance involved mechanical and durability properties and compared with conventional concrete (CC) of the same grade. The compressive strength (CS), split tensile strength (STS), and modulus of elasticity (MOE) were directed to assess the mechanical properties, and rapid chloride penetration test (RCPT), water permeability, and carbonation tests were directed to assess the durability features of GPC. The study demonstrated that PPF-reinforced GPC exhibited higher CS, STS, better resistance to chloride penetration, lower water permeability, and reduced carbonation compared to CC of the same grade making it a promising alternative to CC with certain advantages and disadvantages. Also, the obtained experimental results and behavior of GPC with PPF examine the influence of different dosages of PPF on the mechanical and durability characteristics. These findings can be utilized to explore different combinations of raw materials and mix designs to optimize the performance of GPC.

Keywords: Geopolymer Concrete, Conventional Concrete, Polypropylene Fibers, Carbonation, Water permeability, Rapid Chloride Penetration test.

TRACK C3, C4, C5 **PAPER ID 70**

Comparative Analysis of Two-Wheeler-Induced Traffic Congestion: A Global Perspective

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ABSTRACT

This review study explores the complex topic of traffic congestion caused by two-wheeler usage, comparing the situation in India to that of other countries across the world. The research endeavours to conduct a thorough analysis of the obstacles that two-wheelers present in their role as contributors to traffic congestion, as well as the various approaches that have been utilized worldwide to address this widespread problem. The method includes a careful examination of the patterns and root causes of the traffic congestion caused by two-wheelers in Indian cities, as well as a comparative analysis with a subset of other nations. The study analyses the effectiveness of several mitigation strategies on a worldwide scale, taking into consideration local differences in the infrastructure, cultural norms, and economic circumstances that affect traffic patterns. Population density, urbanization developments, transportation infrastructure, and cultural factors that contribute to the particular difficulties brought on by two-wheeler traffic congestion are some of the important factors that are being studied. The current research seeks to look at innovative and successful approaches that have been implemented globally, including technology breakthroughs, interventions in urban design, public transit systems, and governmental measures. By synthesizing data from India and diverse global context, this review aspires to provide valuable insights for policymakers, urban planners, and transportation authorities. The findings aim to contribute to a nuanced understanding of effective traffic management strategies, facilitating the development of tailored solutions for mitigating two-wheeler induced congestion in Indian cities. This review paper conducts a comprehensive comparative analysis of traffic congestion in India and several other countries, exploring the diverse factors contributing to this urban challenge and scrutinizing the array of solutions implemented globally.

Keywords: India, Traffic Congestion, Two-wheeler, Countries.

TRACK C3, C4, C5 **PAPER ID 81**

Investigation of operational efficiency between freight transport and fleet management systems: A case study

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ABSTRACT

This study explores the critical role of freight transport in contemporary fleet management. As global commerce continues to expand, efficient and streamlined transportation of goods becomes paramount for businesses to thrive. The study investigates the intricate interplay between freight transport and fleet management systems, aiming to elucidate the impact on operational efficiency, cost-effectiveness, and overall sustainability. Key aspects such as route optimization, vehicle utilization, and technology integration are scrutinized to unveil their contributions in enhancing fleet performance. The abstract delves into the challenges and opportunities presented by emerging trends, such as electrification and autonomous vehicles, within the context of freight transport. By synthesizing insights from logistics, technology, and transportation management, this research contributes to a comprehensive understanding of the dynamic landscape surrounding freight transport in the realm of fleet management. The findings are anticipated to provide valuable guidance for industry stakeholders seeking to optimize their logistics strategies and adapt to the evolving demands of modern supply chains.

Keywords: freight transport, fleet management, logistics, operational efficiency, cost-effectiveness, sustainability, route optimization, vehicle utilization.

TRACK C3, C4, C5 **PAPER ID 35**

Application of Artificial Neural Networks in Rainfall-Runoff Modeling

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ABSTRACT

If we see the artificial neural network is similar to the working of the human brain and biological nervous systems, There are many applications in various fields for artificial neural networks due its ability to solve complex problems. In recent years many of the hydraulic problems finding their solution using ANNs. In this study, ANN models results are compared with the formula based conceptual models which predict runoff. The network called Feed forward back propagation artificial neural network is used for the estimation of runoff from rainfall for the study area in Aurangabad.The accuracy for the result is tested to check the sensitivity of the training data. As the study area doesn't have clear records of meteorological data available that problem is resolved using ANN network which not only test data but also predict missing values of data, gives reliable systematic approach, reduces the lengthy data sets for calibration and increase the speed of calculations by reducing the time of model calibration and also estimate missing year data. ANN also overcomes the drawbacks of existing methods and increases estimation accuracy.

Keywords: Artificial neural network, Rainfall-Runoff model, Precipitation, Back-propagation algorithm.

TRACK C3, C4, C5 **PAPER ID 40**

Study of influence of Zeolite Application in Rigid pavement and Strength Prediction through Regression Analysis

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ABSTRACT

Concrete is widely employed in construction due to its cost-effectiveness and high durability. A crucial factor impacting concrete performance is the quality of cement used in its production. Incorporating Pozzolanic mineral additives like fly ash and GGBFS during concrete production can result in significant environmental and economic benefits. This addition is known to decrease the calcium hydroxide content in the cement paste, enhancing the permeability of the concrete. Zeolites are alumina silicates characterized by crystalline structures with uniform pores and cavities. They possess unique properties such as molecular sieving, ion exchange, a large surface area, and catalytic activity, making them highly promising for various industrial applications. The Pozzolanic properties of Zeolite primarily arise from their SiO2 and Al2O3 content, which react with calcium hydroxide (CaOH2) generated during cement hydration. This reaction transforms CaOH2 into Calcium Silicate Hydrate (CSH) gel, ultimately improving the microstructure and impermeability of the concrete. Attempts have been made to utilize zeolite concrete additives to neutralize harmful substances, especially those found in fire extinguishing materials. Although the concrete's CO2 absorption with added zeolite has not been precisely measured, zeolite demonstrates strong adsorption properties for CO2 and NOx. This study aims to investigate the impact of incorporating Natural Zeolite on the strength properties of concrete. Statistical tools like the Statistical Package for the Social Sciences (SPSS), Python, are employed for regression analysis to propose various formulas for strength prediction. The predicted results are subsequently validated through laboratory tests on concrete blended with Zeolite. Application of Zeolite in Rigid pavement stands for marginal cost saving yet it has greater impact as far as Environmental criteria is considered. Regression model developed suggests the high accuracy model.

Keywords: Rigid Pavement; Zeolite; Regression; SPSS; Excel; Python.

TRACK C2 **PAPER ID 21**

Development of Rating system Using AHP and RII for the Assessment of Green Campuses in India.

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ABSTRACT

Green campus rating tools are used to assess a sustainability of campuses. These rating tools cannot be applied to each location, as rating tools have some restrictions. The objective of this study is to establish a new rating tool that could be used to evaluate the greenness of new campuses in India. For this, a study was carried out by utilizing nine green components and 56 attributes essential for measuring greenness of a campus. A three-level hierarchical structure was built to evaluate the green Campus index (GCI), with the green buildings at Level 1, the nine components, and the 56 attributes at Level 2 and Level 3, respectively. An integrated methodology using the Relative Importance Index (RII) and the analytical hierarchy process (AHP) was used in this study. The weights of the components were determined using the AHP considering the 249 responses from green building specialists. Using RII, the relative relevance of various attributes was calculated. Lastly, the weighted-sum method (WSM) was used to obtain the total GCI. The proposed outcomes are compared with the Indian rating tools. The results of the study may find useful to the planners, designers, and developers of green buildings.

Keywords: Green Campus; Analytical Hierarchy Process; Relative Importance Index; Green Campus Rating Tool; Green Campus in India

TRACK C2 **PAPER ID 28**

Exploring the quality and safety aspects of LGSF -Ferron modular construction

ABSTRACT

The Indian construction industry faces an affordable housing crisis, necessitating alternative construction technologies. Traditional methods, like brick and concrete, are labour-intensive and expensive. Modular technologies, previously limited to low-rise buildings, are now being adopted for multi-storey projects. Among these, Light Gauge Steel Frame (LGSF) construction stands out as a cost-effective and efficient solution. LGSF uses high tensile steel, cold-formed into tailored profiles, creating a robust yet lightweight framework. When combined with Ferron a composite material this framework enhances structural integrity, reduces costs, and accelerates construction by eliminating the need for formwork. LGSF-Ferron offers benefits such as increased fracture resistance and sustainability, making it a viable alternative to reinforced concrete. Despite its advantages, LGSF-Ferron modular construction in India is still emerging, with critical quality and safety aspects needing attention. High standards in these areas are essential to prevent financial losses, delays, and injuries. This paper explores the quality and safety aspects of LGSF-Ferron modular construction, emphasizing stringent quality assurance and effective safety management. By examining benefits, challenges, and potential solutions, the study provides insights into how LGSF-Ferron can contribute to sustainable and affordable housing in India, highlighting the importance of pre-engineered components, on-site inspections, and regulatory compliance.

Keywords: LGSF Ferron, modular construction, Safety, sustainability, quality control

TRACK C2 **PAPER ID 44**

Simulating low pressure scenarios for different minimum and required pressure conditions

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ABSTRACT

For sustainable development in rural and urban areas adequate water supply is requisite. The water supply is one of the significant components and is most of the time subjected to low pressure scenarios due to pipe failure, leakages, fire demand, natural disaster etc. These scenarios affects pressure and demand in an area and consumer do not receive adequate water supply. To tackle these issues digital transformation of water distribution network and sustainable management is initiated by United Nations. The research study objective is to simulate water distribution network for non uniform required and minimum pressure conditions under low pressure scenarios and develop prerequisite for optimization, real time monitoring and effective maintenance program using the Internet of things (IoT), Artificial Intelligence (AI), and new-generation information communication technology (ICT). The study is proposing integration into smart technologies to mitigate the issues related to low pressure scenarios.

Keywords: Low pressure scenarios, water distribution network, sustainable management, Artificial Intelligence, real time monitoring

TRACK C2 **PAPER ID 53**

Effective Positioning of Shear Wall in Multistoried Building in Medium Soil Condition Using Response Spectrum Analysis

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ABSTRACT

Shear walls are among the most crucial structural elements used in multi-story buildings in recent years. This study investigates the effects of medium soil conditions on the performance of shear walls as well as the optimal location for them in buildings. The floors in this study varies as G+12. The "Criteria for Earthquake Resistant Design of Structures" (IS 1893: 2016) provides a Response Spectrum Method for medium soil type. The behaviour of the building under the soil conditions specified in IS 1893:2016 (Part I) was determined using Staad Pro. Seismic conditions in Zone 4 were used for the analytical analysis.

Keywords: *Earthquake, soil conditions, Staad Pro.*

TRACK C2 **PAPER ID 99**

A Review on FRP Retrofitting Materials and Techniques for RC Beams under Flexural and Impact Loading

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ABSTRACT

Structural retrofitting is essential for maintaining and enhancing the performance of reinforced concrete (RC) structures subjected to flexural and impact loading. This paper reviews the application of Fiber Reinforced Polymer (FRP) materials, including CFRP, GFRP, and AFRP, for retrofitting RC beams. FRP materials offer high strength-to-weight ratios, corrosion resistance, and ease of installation, making them superior to conventional methods. Techniques such as Near Surface Mounted (NSM) and Externally Bonded (EB) FRP significantly improve the flexural capacity, stiffness, and impact resistance of RC beams. Despite the advantages, challenges such as debonding, rupture, and long-term durability remain. The findings highlight the potential of hybrid FRP systems and the need for further research to optimize retrofitting techniques, ensuring the safety and longevity of structures under various loading conditions.

Keywords: Retrofitting techniques; Fiber Reinforced Polymer; CFRP; Flexural strengthening; Impact loading

TRACK C2 **PAPER ID 39**

Experimental Investigation on Magnetic Concrete for Wireless Charging

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ABSTRACT

In order to essentially create magnetic concrete, sort of soft magnetic ingredients basically are for the most part added to a really normal cement slurry, generally such as crushed ferrite, iron oxide grains, or leftovers of amorphous or nano-crystalline metallic magnetic materials, or so they particularly thought. Magnetic generally concrete generally is the end product of this procedure in a kind of big way. This results in the creation of magnetic concrete, which generally is essentially a mixture of cement and water, which really is quite significant. This really specific mixture basically is also known by its popular term, "magnetic cement mortar" in definitely common usage, which kind of is quite significant. By vibrating the mixture, compacting it, and letting it cure for the required length of time, one can for all intents and purposes produce a very certain type of generally concrete that essentially has fairly specific magnetic properties, really contrary to popular belief. One day, sort of electric cars might essentially be able to mostly go endlessly for the most part thanks to magnetic concrete, showing how magnetic actually concrete mostly is the end product of this procedure in a subtle way.

Keywords: Ferrite Magnet; Wireless Charger; Magnetic Concrete; Electric Vehicle.

TRACK CM (IKS) **PAPER ID 97**

A Systematic Integration of Modern Education System and Ancient Indian Education System to Plan Home-Schooling in India

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ABSTRACT

In recent years, the concept of home-schooling in India has gained momentum as parents seek alternative educational pathways that offer personalized learning experiences. Integrating the modern education system with elements from the ancient Indian education system provides a unique opportunity to enrich home-schooling methodologies. The modern education system is characterized by structured curricula, technological integration, and an emphasis on critical thinking and global awareness. In contrast, the ancient Indian education system, epitomized by the Gurukul tradition, emphasized holistic development, moral education, and experiential learning. This paper explores a systematic approach to integrating these two systems to create a home-schooling model that is culturally relevant and academically robust. The proposed model emphasizes a learner-centric approach, combining the flexibility and technological advancements of modern education with the moral values, discipline, and personalized mentorship of ancient practices. By incorporating ancient Indian texts, meditation, and yoga, alongside contemporary subjects like science, technology, engineering, and mathematics (STEM), the model aims to foster well-rounded individuals. This integration encourages students to develop a deep-rooted understanding of their cultural heritage while preparing them for the challenges of the modern world. Furthermore, the model suggests incorporating community-based learning, allowing students to engage with local traditions and skills, thus preserving indigenous knowledge. The paper argues that such a hybrid approach could provide a more holistic educational experience, meeting the diverse needs of students in India and paving the way for innovative educational practices in home-schooling.

Keywords: Home-schooling in India, Modern Education System, Ancient Indian Education System, Holistic Development, Personalized Learning

TRACK CM (IKS) **PAPER ID 102**

Evaluating The Aptness and Effectiveness of Introducing Indian Knowledge Systems to First-Year Engineering Students

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ABSTRACT

As per the guidelines of NEP 2020 a course named Indian Knowledge System is being introduced in many institutes offering higher education in India. The attention this course has got after the announcement of NEP 2020 has motivated the current research to study the aptness and effectiveness of the Indian Knowledge System. The paper attempts to understand the design and structure of the course and students' perspective towards the course. The study was carried out at Pimpri Chinchwad College of Engineering, Pune where the course named IKS has been introduced and students have taken the course. The research methodology includes qualitative and quantitative approaches where a student survey was conducted. The result and discussion shows that the course was welcomed by the students and it has boosted students' interest in the Indian Knowledge System. Students felt the course was highly relevant to their other core program courses. The course has enhanced students' understanding of the Indian Knowledge System.

Keywords: Indian Knowledge System, IKS, NEP, Higher Education

TRACK CM (IKS) **PAPER ID 103**

Understanding the Indian Knowledge System: A Historical and Contemporary Perspective

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ABSTRACT

The Indian Knowledge System (IKS) is a vast and intricate framework encompassing a range of disciplines, including philosophy, science, mathematics, medicine, and the arts. Rooted in ancient texts and traditions, IKS has played a crucial role in shaping not only the Indian subcontinent but also contributing to global knowledge. This paper provides a comprehensive overview of IKS, exploring its origins, key components, and its relevance in the modern world. Through an examination of ancient texts, philosophies, and scientific advancements, this paper aims to shed light on the enduring significance of IKS. Additionally, the paper will discuss the modern resurgence of IKS, exploring how these ancient systems can be integrated with contemporary knowledge frameworks to address current global challenges

Keywords: Indian Knowledge System; ancient texts**.**

TRACK CM (IKS)	PAPER ID 108

Drama Theater in Nāṭyaśāstra

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ABSTRACT

India is a prosperous country that was once known as the land of gold. Many inventions took place here, and masterpieces such as the Vedas and the Bhagavad Gita were written here, which are treasures of knowledge. But when we observe the creation and vastness of ancient temples, it reflects how prosperous and advanced we once were. Similarly, we still build theaters as described by Bharata Muni. The design remains the same, but we use modern techniques and materials.This research paper discusses the ancient theater as described in Bharatamuni's 200 BCE text, the Nāṭyaśāstra. It reveals 18 different types of theaters based on their design and structure, and also describes various methods of construction. According to Abhinavagupta and Viśveśvara, the paper provides insights into construction techniques. The methodology of this research paper is descriptive. It details the methods of theater construction as described by Bharatamuni. This research is expected to offer new perspectives for civil engineers and introduce innovative ideas for building construction. The paper aims to bring the rich tradition of Indian knowledge to the forefront.

Keywords: Theater, oblong (vikṛṣṭa), square (caturaśra), triangular (tryasra)

TRACK CM (IKS) **PAPER ID 109**

The Hidden Wisdom of Soil: Lessons from the Past

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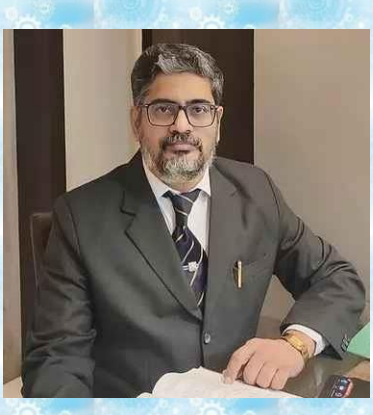
ABSTRACT

This paper looks at the rich history of ancient Indian architecture and engineering, focusing on the knowledge found in old Sanskrit texts. Many of the buildings from ancient India have lasted for centuries, showing how advanced and durable the construction methods of the past were. These structures are not just old buildings; they represent the great achievements in building and design by our ancestors, who had a deep understanding of materials and construction that they carefully developed over time.

The study examines ancient methods of testing soil, as described in Sanskrit texts like Vāstuśāstra, Maya-mata, and Manasara. These texts provide information on which types of soil are best for construction and how to test soil. The research highlights how important these ancient techniques were. Even though they differ from modern concrete methods, they produced buildings that have stood the test of time.

The goals of this research are to show the value of ancient Indian architectural knowledge and to explore how cultural beliefs influenced building design. The research method involves closely reading and interpreting Sanskrit texts to find information about soil testing and to understand the cultural and philosophical ideas behind these practices. This study aims to appreciate the wisdom of the past and to see how it might be useful in modern architecture, offering sustainable building methods based on these time-tested practices.

Keywords: Ancient Indian Architecture, Construction Techniques, Sanskrit Texts, Soil Testing, Vāstuśāstra.



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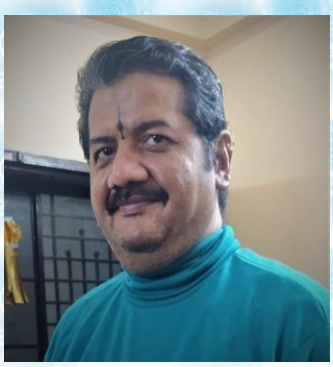

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