

Program Book

ICO-SEID 2024

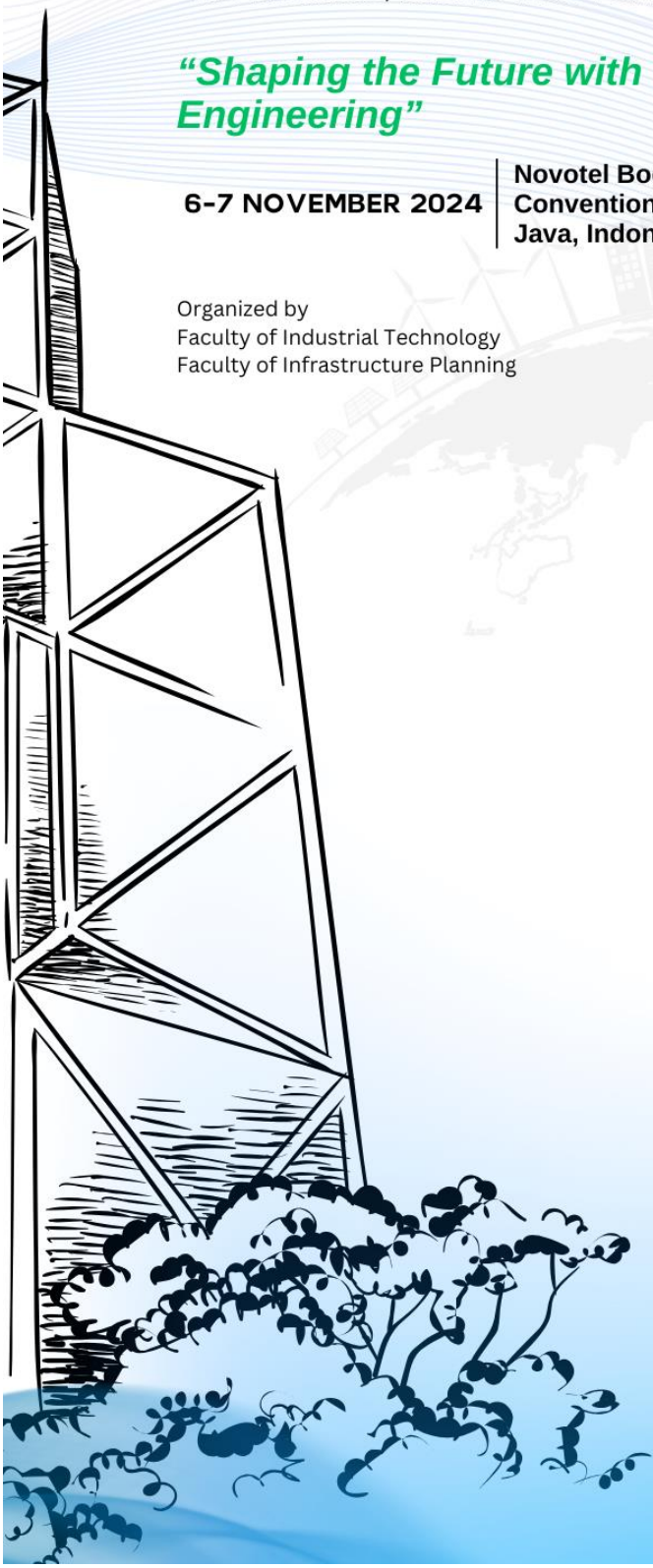
THE 2ND INTERNATIONAL CONFERENCE ON SUSTAINABLE
ENGINEERING, INFRASTRUCTURE, AND DEVELOPMENT

*“Shaping the Future with Resilient and Sustainable
Engineering”*

6-7 NOVEMBER 2024

Novotel Bogor Golf Resort &
Convention Center Bogor, West
Java, Indonesia

Organized by
Faculty of Industrial Technology
Faculty of Infrastructure Planning





Welcoming Remarks from Rector

Dear Participants,

It is a great pleasure to welcome you to the 2nd International Conference on Sustainable Engineering, Infrastructure, and Development (ICO-SEID 2024) at Universitas Pertamina, we are committed to advancing knowledge and fostering innovation in sustainable engineering. This conference serves as a platform for researchers, academics, and professionals from across the globe to share insights, exchange ideas, and collaborate on the critical challenges of shaping a resilient and sustainable future.

As we gather here, our focus is not only on the technological advancements in engineering and infrastructure but also on developing solutions that respect and enhance our environment. The theme for this year, "**Shaping the Future with Resilient and Sustainable Engineering**," reflects our collective vision to build a sustainable future through research and development that aligns with global sustainability goals.

On behalf of Universitas Pertamina, I extend my gratitude to the organizing committee, our distinguished speakers, and each participant. May this conference inspire new ideas, foster meaningful collaborations, and contribute to the advancement of sustainable practices worldwide.

Thank you for your participation and commitment to a sustainable future.

Warm regards,

Prof. Dr. Ir. Wawan Gunawan A. Kadir, MS
Rector of Universitas Pertamina



Welcoming Remarks from Chairwoman

As the Chairwoman of ICO-SEID 2024, I am honored to welcome delegates from around the globe to a pivotal event dedicated to "Shaping the Future with Resilient and Sustainable Engineering". This conference symbolizes our collective commitment to tackling the pressing challenges of our times through innovative engineering solutions. Our theme emphasizes the necessity for an integrated approach that combines resilience with sustainability to create systems and infrastructures capable of withstanding future challenges while protecting our environment for future generations. It is a platform where experts, practitioners, scholars, and young innovators come together to exchange knowledge, strategies, and case studies that highlight the path forward in engineering.

The need for sustainable and resilient solutions has never been more urgent. As we face escalating environmental crisis and societal demands, the engineering community must rise to the occasion and lead the way in sustainable practices and designs. ICO-SEID 2024 aims to serve as a crucible for these ideas, fostering discussions that span the breadth of engineering disciplines and delve into both current technologies and pioneering research. Our sessions and workshops are designed to provoke thought, inspire action, and promote an interdisciplinary approach, ensuring that participants leave with practical and innovative strategies to apply in their fields.

I eagerly look forward to the rich interactions that ICO-SEID 2024 will facilitate. This conference is not just an event, but a starting point for enduring collaborations and a catalyst for significant contributions to our global community. The insights gained and relationships forged here will undeniably influence our professional landscapes and assist us in our mission to build a resilient and sustainable world. I encourage each participant to engage fully, challenge conventional thinking, and contribute to a dialogue that will drive our professions towards a more sustainable future. Together, let us make ICO-SEID 2024 a milestone event in the advancement of resilient and sustainable engineering.

Warm regards,

Dr. Eng. Sri Hastuty, S.T.,M.T.,M.Eng.
Chairwoman of ICO-SEID 2024

Committee

Steering Committees :

- Prof. Dr. Ir Wawan Gunawan A. Kadir, MS
- Prof. Dr. Ir. Rudy Sayoga Gautama Benggolo
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- M. Robby Hervindo, S.Sos
- Ir. Tota Simatupang, M.Eng., Ph.D

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- Adita Utami, M.T.
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- Noviana Masta
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- Mardiana
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- Dr.Eng. Yose Fachmi Buys, B.Eng., M.Eng.
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- Laksmi Dewi, S.T., M.Sc.
- Dr.Eng. Ari Rahman, S.T., M.Eng.
- Nurulbaiti Listyendah Zahra, S.T., M.T.
- Resista Vikaliana, S.Si., M.M.
- Agung Nugroho, S.T., Ph.D.
- Dr. Soni Prayogi, S.Pd., M.Si.
- Dr. Arie Sukma Jaya, S.T., M.Eng., IPM
- E. Byan Wahyu Riyandwita, S.T., M.Eng., Ph.D.
- Ardhi Priagung
- Dr.Eng. Muhammad Abdillah, S.T., M.T.
- Evi Siti Sofiyah, Ph.D.
- Ir. I Wayan Koko. S.T., M.T
- Gita Kurnia, S.T., M.Sc.
- Catia Angli Curie, S.T., M.Sc.
- Dita Floresyona, S.Si., M.Sc., Ph.D.

KEYNOTE SPEAKERS



Prof. Shuo-Yan Chou

National Taiwan University of Science and
Technology - Taiwan

Prof. Iman Kartolaksono Reksowardojo
Universitas Pertamina - Indonesia



Dr. Oki Muraza, S.T., M.Sc.

Senior Vice President Technology Innovation
PT. Pertamina (Persero) Indonesia



Dr. Junjuda Unruangsri

Chulalongkorn University-Thailand



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- Dr. Agus Sukarto [Badan Riset dan Inovasi Nasional (BRIN)]
- Dr. Zakariyya Uba Zango [Al Qalam University Katsina, Nigeria]
- Dr. Khoa Ta Dang [Ho Chi Minh University of Technology, Vietnam]
- Dr. Agung Nugroho [Universitas Pertamina, Indonesia]
- Dr. Aqsha [Institut Teknologi Bandung, Indonesia]

Theme of ICO-SEID 2024

“Shaping The Future with Resilient and Sustainable Engineering”

Engineering

- Renewable Energy
- Energy Conversion
- Mathematical Modeling
- Optimization Techniques
- Energy Management Systems
- Applications of Expert Systems
- Advanced Materials
- Telecommunication and Information Technology
- Artificial Intelligence
- Robotics and Automation
- Asset Integrity
- Energy Generation and Storage
- Process and Product Simulation
- Reaction Engineering Catalysis
- Sustainable Logistics and Supply Chain Management
- Forensic Engineering
- Power Systems
- Instrumentation and Control Systems
- Manufacturing Technologies
- Software Engineering

Infrastructure

- Offshore Infrastructure
- Structural and Geotechnical Engineering
- Civil Engineering
- Environmental Science and Technology
- Environmental Management
- Water and Wastewater Treatment
- City and Regional Development
- Climate and Environmental Adaptation and Mitigation
- Life Below Water and Land
- Transportation and Construction Management
- Sanitation

Sustainable Development

- Research Related to SDGs (Sustainable Development Goals)
- Research Related to ESG (Environmental, Social, and Governance)

PROGRAM RUNDOWN

Day 1 – November 6, 2024

Time (WIB)	Description
07.30 - 08.30	Registration
08.30 - 09.00	Opening Hotel Safety Induction Indonesian National Anthem Video Profile of Universitas Pertamina
09.00 - 09.25	Welcoming Speech Chairwoman of ICOSEID 2024 Dr. Eng. Sri Hastuty Rector of Universitas Pertamina Prof. Dr. Ir. Wawan Gunawan A. Kadir, MS
09.25 - 09.30	Official Opening Ceremony
09.30 - 09.40	Art Performance
09.40 - 09.50	Photo Session
09.50 - 10.00	Coffee Break
10.00 - 10.15	Speech President Director of Pertamina Foundation Agus Mashud S. Asngari
10.15 - 11.00	Keynote Speech Prof. Shuo-Yan Chou (National Taiwan University of Science and Technology, Taiwan)
11.00 - 11.45	Keynote Speech Prof. Iman Kartolaksomo Reksowardojo (Universitas Pertamina, Indonesia)
11.45 - 12.00	Appreciation for Keynote Speakers and Photo Session
12.00 - 13.30	Lunch Break
13.30 - 16.00	Conference Parallel Session (I)

Day 2 – November 7, 2024

Time (WIB)	Description
07.30 - 08.15	Registration
08.15 - 08.30	Opening by MC
08.30 - 09.15	Keynote Speech Dr. Junjuda Unruangsri (Chulalongkorn University, Thailand)
09.15 - 10.00	Keynote Speech Oki Muraza, Ph.D (Senior Vice President, Research & Technology Innovation, PT. Pertamina (Persero))
10.00 - 10.15	Appreciation for Keynote Speakers, Photo Session
10.15 - 10.30	Coffee break
10.30 - 11.30	Panel Discussion Success Story of Green Chemistry Implementation Ecolab and GreenLabs (Industrial Perspective)
11.30 - 11.45	Appreciation for Speakers, Photo Session
11.45 - 12.00	Technical Speech Computer-Aided for Research and Development CADIT
12.00 - 13.30	Lunch Break
13.30 - 16.30	Conference Parallel Session (II)
16.30 - 17.00	Coffee Break
17.00 - 17.30	Appreciation Ceremony Announcement of Best Presenters and Best Papers Closing Ceremony

Parallel Session Schedule (Offline) – Day 1 (November 6th, 2024)

Sub-Theme: Sustainable Environment, City, and Industry			
Moderator: Dr.Eng. Mega Mutiara Sari, S.T., M.Si.			
Room: Papandayan			
Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.30 - 13.50	72	Invited Speaker: The Utilization of Solar Pumping For Pressurized Irrigation In Dryland Farming Estate of Upland Rice In Tulang Bawang Barat	Wahyu Gendam Prakoso
13.50 - 14.10	40	Invited Speaker: Life Cycle Sustainability Assessment toward Eco-Industrial Park Development of Jababeka Industrial Estate	Yosef Barita Sar Manik, Ph.D.
14.10 - 14.25	29	Transnational Education Facility as Engines of Sustainable Development in Jababeka Industrial City	Selly Veronica
14.25 - 14.40	58	Ergonomic Innovations in Last-Mile Delivery: The Case for Electric Cargo Bikes in Urban Mobility	Ismail Alif Siregar
14.40 - 14.55	62	The challenge of Integrating Mobile Scavengers into the Formal Sector in South Tangerang, Indonesia	Ruby Silica Putri
14.55 - 15.10	80	Oil Spill Detection to Protect the Marine Ecosystem In Karawang Waters	Mohamad Mahfudz
15.10 - 15.25		Coffee break	
15.25 - 15.40	87	Green Practices in Business: A Systematic Review in Enhancing Environmental and Economic Sustainability	Ronny Trian Surbakti
15.40 - 15.55	89	A review of Integrating Sustainability into Project Portfolio Governance across Organization in Oil Refinery Industry at VUCA Environment	Ridha Satria
15.55 - 16.10	95	Understanding the Role of Environmental Concern on Solar Photovoltaic Adoption: A Systematic Review	Nanang Kurniawan

Sub-Theme: Sustainable Environment, City, and Industry

Moderator: Dr.Eng. Mega Mutiara Sari, S.T., M.Si.

Room: Papandayan

Time (GMT+7)	Abstract ID	Paper Title	Presenter
16.10 - 16.25	124	System Dynamic Analysis Of GRDP In Social Activity Sector	Theodorik Rizal Manik

Parallel Session Schedule (Offline) – Day 1 (November 6th, 2024)

Sub-Theme: Sustainable Logistic & Supply Chain Management

Moderator: Yelita Anggiane Iskandar, S.T., M.T.

Room: Galunggung

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.30 - 13.45	33	The Impact of Lean Tools and Waste Analysis on The Improvement of Process Cycle Efficiency and Manufacturing Lead Time of Pipe Sleeve Fabrication: A Case Study	(Mohamad Fajar Natawijaya)
13.45 - 14.00	46	Implementing MRP (Material Requirement Planning) for managing raw material inventory in a plastic blown film company (Case Study: PT ABC)	R B Seno Wulung
14.00 - 14.15	48	Dynamic System Modeling of Sustainability in Supply Chain Management of Plasma and Inti Palm Oil Plantations	Nur Afni A Kutanga
14.15 - 14.30	50	Modelling of Refrigerated Container Loading Problem for Managing Physical Internet Container	Zara Safira Ramadhani
14.30 - 14.45	76	Transportation and Distribution of Ammunition and Explosives in the Loading and Unloading Process of Indonesian Navy Warships (KRI) at Ammunition Storage Depots: Improving Safety Risk Strategies	NUNIK ENDAH SULISTYAWATI

Sub-Theme: Sustainable Logistic & Supply Chain Management

Moderator: Yelita Anggiane Iskandar, S.T., M.T.

Room: Galunggung

Time (GMT+7)	Abstract ID	Paper Title	Presenter
14.45 - 15.00	86	Internet of Things (IoT) Implementation in Agricultural Supply Chain: A Literature Review and Research Agenda	Hanif Zaidan Sinaga
15.00 - 15.15		Coffee Break	
15.15 - 15.30	96	Demand Characteristics-Based Inventory Management: Spare Part Control Policy for Aging Rotating Equipment Case Study: Gas Compressor and Gas Engine in State-Owned Oil and Gas Company	Marthen Sarungngu
15.30 - 15.45	128	Cluster First Route Second Approach for Fuel Distribution in Central Surabaya Area	M Sandy Nur Hanifa Syifa
15.45 - 16.00	139	Digitalization of Asset Health Management for Oil-Filled Transformer in LNG Plant (Study Case: Badak LNG)	Yoga Dwi Utomo
16.00 - 16.15	140	Sensitivity analysis for the value chain of some potential small-scale LNG cases in Indonesia	M. Hilman Nasrun

Parallel Session Schedule (Offline) – Day 1 (November 6th, 2024)

Sub-Theme: Automation and Diagnostics for Enhanced Industrial Efficiency

Moderator: Dr. Arie Suka Jaya, S.T., M.Eng., IPM.

Room: Malabar

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.30 - 13.45	11	A Reliable Approach for Batik Pattern Classification using Vision Transformer (ViT) Model	Iksan Bukhori

Sub-Theme: Automation and Diagnostics for Enhanced Industrial Efficiency

Moderator: Dr. Arie Suka Jaya, S.T., M.Eng., IPM.

Room: Malabar

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.45 - 14.00	19	Identification Of Cavitation In Centrifugal Pump Using Vibration Analysis Method In Hydro Cracking Complex (Hcc) Area	Dimas Arya Dhipa
14.00 - 14.15	20	Resolving High Vibration Issues in Centrifugal Pumps: A Case Study in Vibration Analysis	M. Fadillah Jonia Putra
14.15 - 14.30	47	Diagnosing Induction Motor Fault Based on Relief Feature Selection Algorithm and Support Vector Machine Model	Felly Anta
14.30 - 14.45	49	Combination of Discriminant Analysis and Minimum Redundancy Maximum Relevance for Induction Motor Fault Diagnosis Using Stator Current Signals	Kurniawan Dwi Yulianto
14.45 - 15.00	57	Sloshing and Stress Analysis of an API 620 Tank Under Seismic Excitation Based on SNI 03-1726-2019: Numerical Evaluation of Code Provisions	Aldarifa Putri Nabilah
15.00 - 15.15		Coffee Break	
15.15 - 15.30	59	Mobile Robot Selection Using AHP MOORA and Simulation Modelling for Material Handling Automation	Athina Ratum
15.30 - 15.45	73	Transformer-LSTM Deep Learning Model for Winding Temperature Prediction in Induction Motors in the Oil and Gas Industry: Enhancing Maintenance Strategies	Joko Supriyono
15.45 - 16.00	92	Anomaly Detection for Carbon Capture Storage Facility using Markov Switching Models	Mochamad Arief Hidayat

Sub-Theme: Automation and Diagnostics for Enhanced Industrial Efficiency

Moderator: Dr. Arie Suka Jaya, S.T., M.Eng., IPM.

Room: Malabar

Time (GMT+7)	Abstract ID	Paper Title	Presenter
16.00 - 16.15	94	Design Implementation of an Automated Guided Vehicle (AGV) System using Arduino Microcontroller and Radio Frequency (RF) Technology	Joni Welman Simatupang and Muhammad Rahman

Parallel Session Schedule (Online) – Day 1 (November 6th, 2024)

Sub-Theme: Advancements in Energy and Materials

Moderator: Agung Nugroho, Ph.D.

Online Room - Kamojang

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.15 - 13.30	Signing in and online room allocation		
13.30 - 13.50	13	Invited Speaker: Exploring the Impact of Pressing Techniques on Mycelium-based Biocomposites	Koay Mei Hyie
13.50 - 14.05	67	Characterization and Performance Study of PVDF-Graphene Oxide Membranes Fabricated Using Highspeed Homogenizer	Arifina Febriasari
14.05 - 14.20	68	The Effect of PETE, HDPE, and LDPE Type of Plastic Waste as Additive on Compression Strength and Temperature Resistance of Architectural Lightweight Bricks	Apif Miftahul Hajji
14.20 - 14.35	118	Synthesis of Activated Carbon Derived from Banana Peel for Application as a Catalyst Support in Fuel Cells	Adhe Paramita

Sub-Theme: Advancements in Energy and Materials

Moderator: Agung Nugroho, Ph.D.

Online Room - Kamojang

Time (GMT+7)	Abstract ID	Paper Title	Presenter
14.35 - 14.50	120	Effects of liquid Fraction Recirculation during Microwave-Assisted Hydrothermal Carbonization on Properties of Coffee Parchment	RAUDAH
14.50 - 15.05	136	Performance of Dye-Sensitized Solar Cell (DSSC) Based on Black Glutinous Rice Extract and Banana Stem Activated Carbon at Various Dye pH	Viqry Pramananda
15.05 - 15.20	137	Indonesia's Energy Security Projection Towards 2060 Net Zero Emission Target	V. Tri Frebrina Harisetyawan
15.20 - 15.35	142	A New Approach in Corrosion Study Using DFT and Monte Carlo Simulation to Investigate the Synergistic Effects Natural Green Inhibitor Citrus Sinensis and Synthetic Benzotriazole on Low Carbon Steel	Abdul Mudjib Sulaiman Wahid
15.35 - 15.50	144	Effect of Extruder Temperature and Composition of PP, ABS, and Fiberglass on physical properties of Composite of 3d printing filament	Muhammad Farhan
15.50 - 16.05	154	Innovative Advanced Material Solutions for Integrated Safety Helmets in Mining	Nina Tania Lestari

Sub-Theme: Advancements in Energy and Materials

Moderator: Agung Nugroho, Ph.D.

Online Room - Kamojang

Time (GMT+7)	Abstract ID	Paper Title	Presenter
16.05 - 16.20	85	Sustainable Biochar Production from Palm Kernel Shell through Slow Pyrolysis: A Life Cycle Assessment of its application as an Eco-Friendly Fertilizer	Muhamad Rhadia Rahman

Parallel Session Schedule (Online) – Day 1 (November 6th, 2024)

Sub-Theme: Optimized Engineering Solutions for Sustainable Industrial Practices

Moderator: Khusnun Widiyati, S.T., M.Eng., Ph.D.

Online Room - Halimun

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.15 - 13.30	Signing in and online room allocation		
13.30 - 13.45	4	Design Optimization of Cold Air Intake (CAI) System with Butterfly Valve for Enhance Engine Performance and Efficiency: A Mitsubishi Lancer Evo VIII Study Addressing SDG 9.4 and 12	Intan Mahardika
13.45 - 14.00	10	Optimized Design for the Flaps Folder Fabrication of Carton Sealer Machine by Automation	Bayu Ardiansyah
14.00 - 14.15	23	Multifactorial contributors to the effectiveness of a mobile solar dryer	SITI NUR AMALINA MOHD HALIDI
14.15 - 14.30	24	Enhancing the Biological Efficiency of White Oyster Mushrooms Through Optimization of Light-Emitting Diodes using Response Surface Methodology	Hamid Yusoff

Sub-Theme: Optimized Engineering Solutions for Sustainable Industrial Practices

Moderator: Khusnun Widiyati, S.T., M.Eng., Ph.D.

Online Room - Halimun

Time (GMT+7)	Abstract ID	Paper Title	Presenter
14.30 - 14.45	25	Thermodynamic Analysis of Steam Turbine Performance Before and After Overhaul Process at PT Geo Dipa Energi (PERSERO) Unit Patuha	Frisca Lovitasari
14.45 - 15.00	27	Prolonged Drying of Sponge: A Comparative Study of Natural Convection Solar Dryer and Open Sun Drying Techniques	HALIM BIN GHAFAR
15.00 - 15.15	110	Herbal Processing Machine Analysis with DEM Approach to Optimizing Mixing Process	Prof. Dr. Any Sutiadiningsih, M.Si.
15.15 - 15.30	112	Numerical Analysis of Soybean Grinding Machine to Evaluate Contact Behavior Loading Material Among Hooper and Roller Grinding	Susi Tri Umaroh, S.Pd., M.Pd.
15.30 - 15.45	113	Numerical Analysis Of The Effect Of Water Cooling Method On Temperature Distribution And Efficiency Of Photovoltaic	Mega Widias Putri
15.45 - 16.00	116	Airflow Inspection to Alacrity Device to Optimize Natural Cooling Reducing Heat Inside the Hardware	Dr. Nur Ahmad Arief, S.Pd., M.Pd.

ICO-SEID 2024

THE 2ND INTERNATIONAL
CONFERENCE ON SUSTAINABLE
ENGINEERING, INFRASTRUCTURE,
AND DEVELOPMENT

PROUDLY PRESENT
6TH - 7TH NOVEMBER 2024



BOGOR, WEST JAVA, INDONESIA

Sub-Theme: Optimized Engineering Solutions for Sustainable Industrial Practices

Moderator: Khusnun Widiyati, S.T., M.Eng., Ph.D.

Online Room - Halimun

Time (GMT+7)	Abstract ID	Paper Title	Presenter
16.00 - 16.15	60	Systematic Literature Review of Ice Slurry Compounds: Viscosity Characteristics, Heat Transfer and Applications	Muktar Sinaga

Parallel Session Schedule (Offline) – Day 2 (November 7th, 2024)

Sub-Theme: Integrative Solutions for Sustainable Energy and Infrastructure Resilience

Moderator: Dr. Nonni Soraya Sambudi, B.Sc., M.Sc.

Room: Papandayan

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.30 - 13.45	35	The Influence of Different Initial Relative Densities and Ambient Temperature Ranges on MICP Treatment Using Direct-Mixing Injection Method	Aulia Afifatuz Zulfah
13.45 - 14.00	36	Experimental Analysis of Bio-cementation Effectiveness on Silica Sand with Varying Initial Water Content	Sifra Dovanka Trista Wewengkang
14.00 - 14.15	51	Analyzing the Potential and Feasibility of Tidal Energy in the Capalulu Strait: Quantitative Methods and Energy Availability Analysis	Krismaya Dwi Hardianti
14.15 - 14.30	77	Identify the Importance of Renewable Tidal Power Generations and Challenges	Krismaya Dwi Hardianti
14.30 - 14.45	78	Dynamic Simulation of Slope Stability in the Zero Point Area of Ciliwung	Helmi SR Pamungkas
14.45 - 15.00		Coffee Break	
15.00 - 15.15	130	Analysis of Road Deterioration on National Road 12 Kemang-Bogor Using Bina Marga and Dirgolaksono & Mochtar Methods to Determine Appropriate Road Improvements	Adita AU Utami

Sub-Theme: Integrative Solutions for Sustainable Energy and Infrastructure Resilience

Moderator: Dr. Nonni Soraya Sambudi, B.Sc., M.Sc.

Room: Papandayan

Time (GMT+7)	Abstract ID	Paper Title	Presenter
15.15 - 15.30	135	Assessment of Offshore Pipeline Integrity Under Anchor-Induced Dents using Finite Element Modeling	Arianta
15.30 - 15.45	138	Development of a Conceptual Framework for 'BEST: Bridge E-Maintenance Smart Tools' – An Integrated System Combining Knowledge Management and Digital Twin Technology	Naufal Budi Laksono
15.45 - 16.00	155	Forensic Engineering For Offshore Pipeline Accident Investigation	Ahmad Taufik, M.Eng, Ph.D, CMRP
16.00 – 16.15	82	Assessing the Sustainability Status and Sustainable Settlement Development in Periurban of Jabodetabek Metropolitan Area	Janthy T Hidayat

Parallel Session Schedule (Offline) – Day 2 (November 7th, 2024)

Sub-Theme: Engineering Innovations: From Power Systems to Human-Centric Design

Moderator: Dr. Fayza Yulia, S.T., M.T.

Room: Galunggung

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.30 - 13.45	8	Powertrain and Integration Analysis of a Small Converted Electric MPV	Ghany Heryana

Sub-Theme: Engineering Innovations: From Power Systems to Human-Centric Design

Moderator: Dr. Fayza Yulia, S.T., M.T.

Room: Galunggung

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.45 - 14.00	15	Static and Dynamic Stability Performance in a Two-Legged Wheeled Self-Balancing Robot Platform	Fathan Maulana Akbar
14.00 - 14.15	16	Design Of HVAC System With Analysis Of Thermal Cooling Load And Air Duct Size In Theater Building	Putu Mega Dana
14.15 - 14.30	18	Analysis of Steam Turbine Generator Overhaul for Efficiency Enhancement at The Power Plant Center of Refinery Unit	Nur Annisa Bahar
14.30 - 14.45	22	Strategic Innovation: Exploring Digital Transformation and Ambidexterity in the Automotive Components Industry	Mohamad Zaki Azizi
14.45 - 15.00		Coffee Break	
15.00 - 15.15	39	Efficiency of Buoyancy Force Generation in a Pump-Based Buoyancy Engine for a Small-Scale Underwater Glider	Yusuf Arindyatama Putra
15.15 - 15.30	61	Planning of Power Capacity, Low Voltage Network and Electrical Installation in the Production of Refuse Derived Fuel Processing	Dwi Listiawati

Sub-Theme: Engineering Innovations: From Power Systems to Human-Centric Design

Moderator: Dr. Fayza Yulia, S.T., M.T.

Room: Galunggung

Time (GMT+7)	Abstract ID	Paper Title	Presenter
15.30 - 15.45	74	Design of an Ergonomic Cooking Table Based on REBA and RULA Analysis to Reduce the Risk of Musculoskeletal Injuries for Operators at PT XYZ	Luq Luq Fathyah Salim
15.45 - 16.00	79	Design and Implementation of Electrical Useage Monitoring Device Base on Internet of Things in Industry	Mochamad Yunus

Parallel Session Schedule (Offline) – Day 2 (November 7th, 2024)

Sub-Theme: Material and Green Process Engineering

Moderator: Agung Nugroho, Ph.D.

Room: Malabar

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.30 - 13.45	37	Simulation of Hydrogen Gas Production from Oil Palm Empty Fruit Bunch (OPEFB) Combined with Carbon Capture Based on Aspen Plus Software	Albie Yusuf Gautama
13.45 – 14.00	108	Electrochemical Enhancement of Pitting Corrosion Resistance of Stainless Steel 201 using Citric Acid	Sri Hastuty
14.00 - 14.15	123	Strength Analysis and Remaining Life Estimation of Storage Tank based on API 650 & 653	Purwo Kadarno

Sub-Theme: Material and Green Process Engineering

Moderator: Agung Nugroho, Ph.D.

Room: Malabar

Time (GMT+7)	Abstract ID	Paper Title	Presenter
14.15 - 14.30	129	Outage Management to enhance plant performance and improve reliability of Coal-Fired Power Plants	ABDULLAH AGUS SALIM CHAMID
14.30 - 14.45	145	Extraction of Gelatin from Mackerel Bone (Restrellinger brachysoma)	Eduardus Budi Nursanto
14.45 - 15.00		Coffee Break	
15.00 - 15.15	146	Mechanical Properties of Biocomposites from Epoxy Resin Reinforced with Sisal Fiber and Teakwood Sawdust	Dr. Yose Fachmi Buys
15.15 - 15.30	147	Mechanical Properties of Water Hyacinth Fiber and Teakwood Sawdust Reinforced Epoxy Biocomposites	Dr. Yose Fachmi Buys
15.30 - 15.45	100	Optimizing Co-firing Ratio of RDF MSW and Coal in a Fluidized Bed Reactor	I Made Agus MA Putrawan
15.45 - 16.00	101	Characterization of Municipal Solid Waste as an Energy Source in the Gasification Process	I Made Agus MA Putrawan

Parallel Session Schedule (Online) – Day 2 (November 7th, 2024)

Sub-Theme: Sustainable Practices in Construction and Disaster Risk Management

Moderator: Nurulbaiti Listyendah Zahra, S.T., M.T.

Online Room – Kamojang

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.15 - 13.30		Signing in and online room allocation	

Sub-Theme: Sustainable Practices in Construction and Disaster Risk Management

Moderator: Nurulbaiti Listyendah Zahra, S.T., M.T.

Online Room – Kamojang

Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.30 - 13.45	44	The effect of using ground granulated blast furnace slag (GGBFS) as a partial substitute for Portland cement in fiber concrete	AMALIA
13.45 - 14.00	54	Crashworthiness Analysis of High-Speed Train Trailer Structure in Indonesia	Muh Luqman Khakim
14.00 - 14.15	63	Effect of Storage Time on Asphalt Modified by KKK60 Pre-vulcanized Latex	Derry Wiliyanda Nasution
14.15 - 14.30	69	The Application of Base Isolation System as Earthquake Resisting Technology on Mulya Medika Hospital, Samarinda	Aditya Yudha Pratama
14.30 - 14.45	88	Analysis of Flood Vulnerability in Medan City Using the Analytical Hierarchy Process (AHP) Based on Geographic Information Systems (GIS)	Syarvina
14.45 - 15.00	106	Analysis of Drought Hazards in the Lake Toba Area	Robi Arianta Sembiring
15.00 - 15.15	156	Evaluation of Airflow and Thermal Comfort of an Automated Rapid Transit (ART) Through Predicted Mean Vote (PMV) and Predicted Percentage Dissatisfied (PPD)	Aina Balqis Azrin
15.15 - 15.30	121	Comparison Of Peak Flood Discharge At Automatic Water Level Recorder (Awlr) Salamsari Catchment	Pradipta Nandi Wardhana

Parallel Session Schedule (Online) – Day 2 (November 7th, 2024)

Sub-Theme: AI, Modeling, and Ergonomics in Practical Applications			
Moderator: Resista Vikaliana, S.Si., M.M., Ph.D.			
Online Room - Halimun			
Time (GMT+7)	Abstract ID	Paper Title	Presenter
13.15 - 13.30		Signing in and online room allocation	
13.30 - 13.45	7	Human-Centered Design for AI Service Chatbots for Kampung Batik Cibuluh Website	Yusraini Muharni
13.45 - 14.00	93	Study on Suspension System Analysis of Electric Vehicles for Disabilities Through a FEM Modelling Approach	Wahyu Dwi Kurniawan
14.00 - 14.15	99	Optimizing Raw Chicken Delivery for a Fried Chicken Business Using K-Means Clustering and Heuristic Approaches to Solve the Vehicle Routing Problem	Said Muhammad Baisa
14.15 - 14.30	103	A Metaheuristic for the Heterogeneous Fixed Fleet Vehicle Routing Problem	Arif Imran
14.30 - 14.45	105	Modelling Study Of MUSAE Trainer with Parametric Modeling Approach and RULA Analysis to Investigate Human Ergonomic	Wijono Wijono
14.45 - 15.00	111	Technology Dissemination for Cooperative Economic Empowerment: A Case Study of 3P Machine Implementation in Sidoarjo	Andre Dwijanto Witjaksono

ICO-SEID 2024

THE 2ND INTERNATIONAL
CONFERENCE ON SUSTAINABLE
ENGINEERING, INFRASTRUCTURE,
AND DEVELOPMENT

PROUDLY PRESENT
6TH - 7TH NOVEMBER 2024



BOGOR, WEST JAVA, INDONESIA

Sub-Theme: AI, Modeling, and Ergonomics in Practical Applications

Moderator: Resista Vikaliana, S.Si., M.M., Ph.D.

Online Room - Halimun

Time (GMT+7)	Abstract ID	Paper Title	Presenter
15.00 - 15.15	119	Human Posture Assessment and Safety Overview Related to Sansak Digital Based Simulation Modelling	Muamar Zainul Arif
15.15 - 15.30	132	Artificial Intelligence as a Productivity Tool for Human Resource Competency Development: A Systematic Literature Review	Risa Aisyah

List of Abstract – Talks

Wednesday 6th

13.30 – 13.50 Parallel Season 1

Sub-Theme : Sustainable Environment, City, and Industry

Room : Papandayan

Presenter : Wahyu Gendam Prakoso

The Utilization Of Solar Pumping For Pressurized Irrigation In Dryland Farming Estate Of Upland Rice In Tulang Bawang Barat

Heny Purwanti¹, Wahyu Gendam Prakoso^{1}, Pengki Irawan²*

Universitas Pakuan¹, Universitas Siliwangi²

Abstract. This study explores the large-scale application of solar-powered pumping systems for pressurized irrigation in a 100-hectare upland rice (padi gogo) cultivation area in Tulang Bawang Barat. A solar array of 150 kW was installed, supplying 1.2 million liters of water daily with a pressure of 3-4 bars to support drip irrigation. The system improved Water Use Efficiency (WUE) by 40%, with a water delivery rate of 200,000 liters per hour. Crop yield increased by 30%, reaching 5 tons per hectare compared to 3.5 tons under rain-fed conditions. The total investment of approximately USD 500,000 resulted in a payback period of 5-6 years, with operational costs reduced by 70%. This demonstrates that solar pumping is a viable and scalable solution for improving irrigation efficiency and crop productivity in water-scarce regions, promoting sustainable agriculture and renewable energy use.

Keywords: Solar pumping, Pressurized irrigation, Dryland farming, Upland rice, Sustainable agriculture.

13.50 – 14.10 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry

Room : Papandayan

Presenter : Yosef Barita Sar Manik, Ph.D.

Life Cycle Assessment of an Industrial Estate Wastewater Treatment System in Bekasi Regency

Syifa Ditia¹, Yosef Barita Sar Manik¹

President University¹

Abstract. Effective environmental remediation infrastructure is a crucial factor in addressing the challenge of eco-industrial park development. This study assesses the potential environmental impacts of the wastewater treatment system located in Bekasi Regency of West Java, Indonesia, that serves an industrial complex which occupies an area of approximately 5,600 hectares for the manufacturing and other operations of more than 2,000 companies. The study employed Life Cycle Assessment methodology with a functional unit of 1,000 m³ of processed water. Data from the company records covering the plant operation from January to December 2023 was inventorized and analyzed using the ReCiPe 2016 Midpoint (H) method through OpenLCA package v.2.2.0 to unravel the potential environmental impacts and major primary hotspots. Meta-analysis method was further employed to compare the impact assessment results with nine other similar systems selected using purposive sampling. It was found that for most impact categories, the potential impacts caused by this wastewater treatment system were lower than the average potential impacts of other systems, except for the Stratospheric Ozone Depletion (3.144×10^{-4} kg CFC-11 eq) and Terrestrial Ecotoxicity (1.061×10^2 kg 1,4-DCB eq). This performance is attributed to the technology used in the critical process, which is biological treatment process that promotes minimal resources use and emission. The major hotspot of this system is the utilization of coal-based electrical energy. Given Indonesia's geographic location and climate, switching to clean energy such as solar panels is a recommended improvement option towards the development of eco-industrial park.

Keywords: Wastewater treatment; life cycle assessment; industrial estate; eco-industrial park

14.10 – 14.25 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry
Room : Papandayan
Presenter : Selly Veronica

Transnational Education Facility as Engines of Sustainable Development in Jababeka Industrial City

Selly Veronica¹, Hadi Jaya Putra¹

President University¹

Abstract. Urbanization directs dynamic transformation in the Jababeka Industrial City (JIC). This research investigates the role of Transnational Education Facilities (TEF) existence in shaping the social and economic aspect as the engine of JIC sustainable development. By analyzing the interaction between academic institutions and industrial sectors, the study explores how TEF acts as engines of urban growth through the economics and social diversity of its community. Through case studies and qualitative analysis, the research highlights the contributions of university-led initiatives in fostering a circular economy, spatial utilization, and cultural harmony within the JIC. The findings highlight that providing the fundamental needs of TEF are crucial for ensuring long-term sustainable JIC development with strategic socio-economic movement. This study provides valuable insights for policymakers, educational institutions, and industry leaders on leveraging TEF to enhance industrial sustainability in urban settings like JIC.

Keywords: Circular Economy, Social Harmony, Spatial Utilization, Sustainable Urban Development, University Impact

14.40 – 14.55 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry

Room : Papandayan

Presenter : Ruby Silica Putri

The challenge of Integrating Mobile Scavengers into the Formal Sector in South Tangerang, Indonesia

Ruby Silica Putri¹, Gabriel Andari Kristanto¹, Astryd Viandila Dahlan¹

Universitas Indonesia¹

Abstract. Rapid population growth in South Tangerang, Indonesia, has significantly increased waste generation, leading to the overcapacity of the Cipeucang Landfill. Despite their critical role in recycling, mobile scavengers have been largely overlooked in studies on solid waste management systems (SWMS). This research aims to assess the characteristics of mobile scavengers and analyze the factors influencing their integration into the formal SWMS. A survey of 111 scavengers, conducted through structured interviews using accidental sampling, found that 77% were migrants, with 60% having over five years of experience, working more than eight hours daily. While 75.9% supported formal integration due to benefits like social security and health insurance, concerns about the administrative burden of adopting technology were common. The study concludes that improving facilities and providing targeted support could enhance scavenger productivity. Understanding their needs and preferences is crucial for developing effective SWMS integration strategies.

Keywords: Solid waste, Indonesia, informal sector, recycling, mobile scavenger.

14.55 – 15.10 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry

Room : Papandayan

Presenter : Mohamad Mahfudz

OIL SPILL DETECTION TO PROTECT THE MARINE ECOSYSTEM IN KARAWANG WATERS

Mohamad Mahfudz¹, Rian Nurtyaman¹, Rudie Rachmat Atmawidjaja¹, Yudi Firmansyah¹, Rina Muthia Haraphap¹, Diah Kirana Kresnawati¹

Universitas Pakuan¹

Abstract. Indonesian waters frequently experience pollution caused by oil spills, such as the incident in Karawang Waters in July 2019, where oil and gas leaks from the YYA-1 well of the Offshore North West Java Block, owned by PT. Pertamina Hulu Energi, resulted in marine pollution. Spatial detection of oil spill distribution is necessary to analyze the characteristics, extent, and direction of the oil spread. Detection was carried out using remote sensing radar technology, which can penetrate clouds, utilizing the adaptive threshold method for faster and more efficient detection. Sentinel-1A imagery with VV and VH polarization was used on July 18, August 11, September 16, and October 10, 2019. The detection results indicated that from July to September, the oil spill spread westward, while by October, the oil spill had been cleaned. Detection using VV polarization provided better results compared to VH polarization. In July, the extent of the oil spill reached 27.524 km² (VV polarization) and 19.521 km² (VH polarization). In August, the area decreased to 10.386 km² (VV polarization) and 8 km² (VH polarization). In September, the oil spill was detected covering 3.277 km² (VV polarization) and 2.245 km² (VH polarization), while in October, no oil spill was detected.

Keywords: Sentinel-1A imagery; oil spill; adaptive threshold; VV and VH polarization, Karawang waters



15.25 – 15.40 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry

Room : Papandayan

Presenter : Ronny Trian Surbakti

Green Practices in Business: A Systematic Review in Enhancing Environmental and Economic Sustainability

Ronny Trian Surbakti¹, Syarifah Hanoum¹, Muhammad Yusak Ansori³

Institut Teknologi Sepuluh Nopember¹, Universitas Nahdlatul Ulama Surabaya³

Abstract. This paper reviews the existing literature on green practices in business, focusing on their role in enhancing both environmental and economic sustainability. The systematic literature review identifies key green practices, their adoption in various industries, and their contribution to sustainable performance. The paper further discusses implications for policy and practice, highlighting future directions for research and implementation. . The review discusses the difficulties of implementing green practices and suggests more areas of investigation that can help organizations to be more sustainable regarding business models. Includes practices and efforts such as sustainable performance, green, environmental economics treaties, economical measurements, management of sustainability.

Keywords: include green practices, sustainable performance, environmental management, and economic sustainability.



PROUDLY PRESENT
6TH - 7TH NOVEMBER 2024



BOGOR, WEST JAVA, INDONESIA

15.40 – 15.55 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry

Room : Papandayan

Presenter : Ridha Satria

Integrating Sustainability into Project Portfolio Governance across Organization in Oil Refinery Industry at VUCA Environment

Ridha Satria¹, Chistiono Utomo¹, Silvianita¹

Institut Teknologi Sepuluh Nopember¹

Abstract. The oil and gas sector faces challenges in integrating sustainability into project portfolio governance, particularly in VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) environments. This study aims to define sustainable project portfolio governance (SPPG) and develop a comprehensive framework for SPPG in the oil refinery industry. A mixed-methods approach was employed, including a literature review, conceptual analysis, and expert interviews. The results indicate a need for a tailored framework that incorporates sustainability principles across three governance levels: organizational, Project Portfolio Management Office (PPMO), and project, corresponding with the triple bottom line of sustainability. The developed framework, validated through expert feedback, demonstrated improved alignment with sustainability goals, optimized resource utilization, and enhanced risk management. The discussion highlights the framework's potential to increase resilience and sustainability in oil refinery organizations by addressing unique industry challenges. By achieving these objectives, the study contributes to better project outcomes and organizational sustainability in a rapidly changing environment.

Keywords: Sustainable Governance, Project Portfolio Management, VUCA, Oil and Gas Sector, PPMO

15.55 – 16.10 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry

Room : Papandayan

Presenter : Nanang Kurniawan

Understanding the Role of Environmental Concern on Solar Photovoltaic Adoption: A Systematic Review

Nanang Kurniawan¹, Soerijanto¹, Reny Nadlifatin¹

Institut Teknologi Sepuluh Nopember¹

Abstract. The primary objective of this article is to reveal the role of environmental concerns in the adoption of solar photovoltaic technology by conducting a systematic literature review and analysing the diverse findings from the existing studies. Data collection for this review follows the “Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA)” guidelines where 42 articles met the criteria and revealed significant variability in findings. According to the analysis, it is found that the influence of environmental concerns on solar PV adoption is mixed. While some research highlights environmental awareness as a key driver of solar PV adoption, other studies suggest that it plays a more limited or even negligible role. Environmental concern has been found to have a complex and, at times, counterintuitive relationship with PV system adoption. The impact of environmental concerns on solar PV adoption is sometimes ambiguous, with certain research emphasizing its significance, while others indicate that financial advantages frequently prevail. To clarify these ambiguities, it is essential to investigate the mediating variables that may explain the correlation between environmental concern and adoption intention. This will help clarify the primary motives for adoption from an environmental perspective, thereby improving the strategic deployment of solar photovoltaic technology and advancing sustainability objectives.

Keywords: environmental concern, solar photovoltaic adoption, systematic review

16.10 – 16.25 Parallel Session 1

Sub-Theme : Sustainable Environment, City, and Industry
Room : Papandayan
Presenter : Theodorik Rizal Manik

System Dynamic Analysis Of GRDP In Social Activity Sector

Theodorik Rizal Manik¹, Erma Suryani¹, Arman Hakim Nasution¹

Institut Teknologi Sepuluh Nopember¹

Abstract. South Kalimantan is a province that depends on the mining sector, but this sector is an unsustainable. To shift the leading sector, efforts are needed to improve other sectors, one of which is the social activity. The system dynamic analysis in the social sector is divided into four sub-model groups, namely The Orphanage for Care and Health Recovery sub-model; Organizations for The Retardate Mental, Mental Disorders and Drug Abuse Forbidden sub-model, The Orphanage for The Elderly and Persons with Disabilities sub-model and Within Other Parents Which Are Not Included Otherwise sub-model. In obtaining results on the dynamic system, accurate data is needed and related to social activities in the GRDP of the Business Field. The purpose of this study was to see the correlation between each sub-model in the analysis in increasing the growth of the social activity sector. The method used is a mix method with the subject of the GRDP of the Social Activity Sector. The results of the dynamic analysis explain in detail the factors that play a role in increasing the sector.

Keywords: Modeling, System Dynamic, Social Activity, Sustainable, Business Field

13.30 – 13.45 Parallel Session 1

Sub-Theme : Sustainable Logistic & Supply Chain Management

Room : Galunggung

Presenter : Mohammad Fajar Natawijaya

The Impact of Lean Tools and Waste Analysis on The Improvement of Process Cycle Efficiency and Manufacturing Lead Time of Pipe Sleeve Fabrication: A Case Study

Mohammad Fajar Natawijaya¹, Tota Pirdo Kasih¹

Universitas Bina Nusantara¹

Abstract. This study investigates the implementation of lean tools to enhance process cycle efficiency and reduce production lead time by at least 10% in a case study of pipe sleeve fabrication at one of manufacturing company in Indonesia. Improving production efficiency is a critical investment for manufacture sustainability and competitive advantage. The application of lean tools, such as value stream mapping and pareto analysis, can help reduce process inefficiencies by eliminating non-value-added activities and lead time, such as machine breakdowns, waiting, and material handling. The results demonstrate that the implementation of lean tools can increase Process Cycle Efficiency (PCE) from 39,76% to 51,40% and reduce Manufacturing Lead Time (MLT) by 22,63%. This case study provides insights into how lean tools can be applied to improve productivity in manufacturing processes. Lean tools can be implemented across various manufacturing industries to enhance their productivity. Broader implications of implementing lean method suggest that companies can enhance productivity, reduce costs of production, improve quality, and ultimately increase their competitive advantage in the market.

Keywords: lean manufacturing, process cycle efficiency, manufacturing lead time, value stream mapping, pareto chart.



14.00 – 14.15 Parallel Session 1

Sub-Theme : Sustainable Logistic & Supply Chain Management

Room : Galunggung

Presenter : Nur Afni A Kutanga

Dynamic System Modelling for Managing Sustainable Supply Chain of the Partnership between Smallholder and Core Palm-oil Plantations

Nur Afni A Kutanga¹, Ahmad Rusdiansyah¹

Institut Teknologi Sepuluh Nopember¹

Abstract. The growing of global awareness on environmental issues has driven the adoption of sustainability practices in palm oil industry. This study uses dynamic system modeling to define the supply chain complexities of Plasma and Inti palm oil plantations. By analyzing key elements such as production, distribution, and environmental impact, the model will design more effective policies for sustainability. The model incorporates various Environment, Social and Governance (ESG) factors include environmental considerations like deforestation and carbon emissions, social aspects such as labor welfare and community relations, and governance elements including corporate transparency, ethical practices, and compliance with standards like the Indonesian Sustainable Palm Oil (ISPO). The results of this research can serve as a foundation for designing more targeted policies to improve the sustainability of the palm oil industry. Additionally, the research findings extend beyond improving the industry's sustainability to include enhancing the well-being of local communities.

Keywords: Palm Oil Plantations; Dynamic modelling; Sustainability Supply Chain; ESG



14.15 – 14.30 Parallel Session 1

Sub-Theme : Sustainable Logistic & Supply Chain Management

Room : Galunggung

Presenter : Zara Safira Ramadhani

Modelling of Refrigerated Container Loading Problem for Managing Physical Internet Container

Zara Safira Ramadhani¹, Ahmad Rusdiansyah¹

Institut Teknologi Sepuluh Nopember¹

Abstract. This study develops an extended prototype of The Container Loading Problem (CLP), named Refrigerated Container Loading Problem (R-CLP). The R-CLP aims to maximize volume utilization, minimize container use and ensure product quality through temperature distribution monitoring. In this research we focus on the concept of physical internet. The Physical Internet is a global logistics system that focuses on the physical, informational, and operational aspects of interconnected intermodal hub networks. It promotes sustainability and efficiency. A key component of the physical internet is π -container, a smart container equipped with RFID and GPS that provides real-time information like temperature monitoring, route optimization, and product location, supporting real-time decision-making. Types of π -container include P-containers (Packaging), H-containers (Handling), and T-containers (Transport). We continue to implement the problem and evaluate it by building an algorithm using Visual Basic Application to calculate number and size of H-containers that can fit inside T-containers for perishable product distribution.

Keywords: Physical Internet, π -container, R-CLP, Perishable Product, Sustainable Logistics

15.15 – 15.30 Parallel Session 1

Sub-Theme : Sustainable Logistic & Supply Chain Management
Room : Galunggung
Presenter : Marthen Sarungngu

Demand Characteristics-Based Inventory Management: Spare Part Control Policy for Aging Rotating Equipment Case Study: Gas Compressor and Gas Engine in State-Owned Oil and Gas Company

Marthen Sarungngu¹, I Nyoman Pujawan¹, Niniet Indah Arvitrida¹

Institut Teknologi Sepuluh Nopember¹

Abstract. Aging rotating equipment, such as gas compressors, in Pertamina Hulu Sanga Sanga, faces unpredictable demand for spare parts, making traditional inventory control methods insufficient for managing these complexities. Effective inventory management is vital to reducing downtime and operational costs. Data from maintenance requirement planning and spare part usage at Pertamina Hulu Sanga Sanga were analyzed, alongside interviews with maintenance and inventory control experts. A spare part control policy was developed based on demand characteristics, including lead time, usage frequency, and criticality. The demand characteristics-driven policy improved the availability of critical spare parts, reduced inventory holding costs, and minimized equipment downtime. The findings show that demand characteristics-based inventory policies enhance efficiency and operational reliability for aging equipment. Addressing data accuracy, lead time variability, and supplier capability remains critical. Future research should explore integrating AI and predictive maintenance to enhance inventory management and align with strategic sourcing.

Keywords: Oil and Gas, Aging Equipment, Demand Characteristics, Spare Parts Control Policy, Efficiency and Reliability.

15.30 – 15.45 Parallel Session 1

Sub-Theme : Sustainable Logistic & Supply Chain Management

Room : Galunggung

Presenter : M Sandy Nur Hanifa Syifa

Cluster First Route Second Approach for Fuel Distribution in Central Surabaya Area

M Sandy Nur Hanifa Syifa¹, Syahrudin El Asykari¹, Harummi Sekar Amarilies¹

Universitas Pertamina¹

Abstract. Integrated Terminal Surabaya is one of the integrated terminals managed by Pertamina Patra Niaga in the region of East Java, Bali, and Nusa Tenggara provinces (Jatimbalinus). Besides having responsibilities to receive and store fuel and Liquefied Petroleum Gas (LPG) products, this terminal is also the main source of fuel products sold by 536 gas stations in Surabaya area. To ensure optimized demand fulfillment, route optimization planning with cluster first route second approach is applied. Using K-Means clustering, the 23 gas stations in central Surabaya area are grouped into 3 clusters, and the fuel distribution routes are optimized using ArcGIS. Using only 15 tank trucks, the 21 distribution routes to distribute 67 compartments are successfully completed. All demands were completed under 5 hours or below the 8-hour time windows using 4 units of 16 kiloliters (KL) tank trucks, 6 units of 24 KL tank trucks, and 5 units of 32 KL tank trucks. This cluster first route second approach is better in terms of increasing the percentage of compartment use and reduction of carbon emission compared to baseline.

Keywords: fuel products, distribution, K-Means clustering, Vehicle Routing Problem, ArcGIS

15.45 – 16.00 Parallel Session 1

Sub-Theme : Sustainable Logistic & Supply Chain Management

Room : Galunggung

Presenter : Yoga Dwi Utomo

Digitalization of Asset Health Management for Oil-Filled Transformer in LNG Plant(Study Case: Badak LNG)

Yoga Dwi Utomo¹, Hendro Nurhadi¹, Nani Kurniati¹

Institut Teknologi Sepuluh Nopember¹

Abstract. Throughout decades, LNG Plant has encountered numerous challenges, including aging major equipment, asset health management, and digitalization. Asset health management is critical in maintaining operational efficiency and safety within LNG plants, specifically oil-filled Transformers that powering LNG processing. Transformer failures can disrupt LNG production. This research investigates the integration of digitalization into the prognostic health management of oil-filled transformers in LNG plant, focusing on predictive maintenance, reliability and availability enhancement. Utilizing transformer maintenance records from Badak LNG, which are electrical testing and oil analysis, the study combines traditional time-based methods with digital tools to develop a comprehensive asset health management strategy. Results highlight the succesful integration of digitalization and time-based data which offers substantial benefits by reducing unplanned downtime and associated costs, enhancing reliability and availability, and maintaining operational efficiency in LNG Plant.

Keywords: Oil-Filled Transformer, Traditional Approach, Digitalization, Predictive Maintenance, Asset Health Management

16.00 – 16.15 Parallel Session 1

Sub-Theme : Sustainable Logistic & Supply Chain Management
Room : Galunggung
Presenter : M. Hilman Nasrun

Sensitivity analysis for the value chain of some potential small-scale LNG cases in Indonesia

M Hilman Nasrun^{1,2}, Yuni Kusumastuti¹, Panut Mulyono¹

Universitas Gadjah Mada¹, Pertamina Gas Operation Kalimantan Area²

Abstract. Based on the size, LNG business is classified to the definitions of Standard LNG, Mid/Small-Scale LNG, and Mini/Micro LNG. All of them have own specification for Upstream Liquefaction, Mid-Stream Shipping, Down-Stream Regasification, and Storage. Indonesia have Standard LNG Plant such as Badak LNG, Tangguh LNG and Donggi Senoro LNG, to fulfil the consumer of international market. For the Mid/Small-Scale LNG Plant, the prime and the only one in Indonesia is inaugurated at Tanah Tidung, North Kalimantan, on April 30, 2023. The Plant is constructed by PT Kayan LNG Nusantara, to treat and liquify the raw gas around 22 MMscfd which is produced by JOB Pertamina – Medco E&P Simenggaris. The LNG product is stored at isotank 40 feet and delivered by shipping to the consumer of domestic and international market. Indonesia has no Mini/Micro LNG Plant yet. Regardless the size, Mid/Small-Scale LNG have the same value chain with Standard LNG, consist of the Liquefaction Plant, Transportation (by shipping) and the Regasification Terminal for delivery to the Consumer. This paper explains about sensitivity analysis for the value chain of some potential small-scale LNG cases in Indonesia, such as for the variables of raw gas daily volume, the distance between the Liquefaction Plant and Regasification Terminal etc., to optimize the capital and operational expenditure lead to the feasible investment.

Keywords: Mid/small-scale, LNG, Value chain, Sensitivity analysis, Optimize, Feasible investment

13.30 – 13.45 Parallel Season 1

Sub-Theme : Automation and Diagnostics For Enhanced Industrial Efficiency
Room : Malabar
Presenter : Iksan Bukhori

A Reliable Approach for Batik Pattern Classification using Vision Transformer (ViT) Model

Iksan Bukhori¹, Mia Galina¹

President University¹

Abstract. Batik is one of the most important cultural heritages in Indonesia. There are more than 5000 batik patterns in Indonesia. This poses an interesting challenge on how to promote this art in an easy way, considering the fact that addressing the next generation's lack of understanding of batik patterns is critical to the continuation of this legacy. One answer to such a challenge is to use Machine Learning to easily identify Batik patterns. This study employs a novel Vision Transformer (ViT) architecture to classify 15 different Batik classes with a total dataset consisting of around 300 images. The accuracy of the classification is aimed to be above 95%. Such a model in the future also has a potential to be integrated to multimedia or video games to teach Batik as Indonesia's cultural heritage in a fun and interesting way, allowing this information to be handed down to future generations.

Keywords: Vision Transformer, Batik, Machine Learning, Image Classification, cultural heritage

14.15 – 14.30 Parallel Season 1

Sub-Theme : Automation and Diagnostics For Enhanced Industrial Efficiency
Room : Malabar
Presenter : Felly Anta

Diagnosing Induction Motor Fault Based on ReliefF Feature Selection Algorithm and Support Vector Machine Model

Felly Anta¹, Didik Djoko Susilo¹, Zainal Arifin¹

Universitas Sebelas Maret¹

Abstract. Early fault diagnosis is a crucial element in maintaining the optimal operation of rotating machinery and avoiding sudden failure resulting in material and non-material losses. This research aims to select the salient features for diagnosing the induction motor faults using the SVM model. The induction motor is simulated experiencing three fault scenarios: single fault, double fault, and multiple faults. These scenarios consist of stator fault, rotor fault, bearing fault, stator-bearing fault, stator-rotor fault, bearing-rotor fault, and stator-bearing-rotor fault. Vibration signals for each of these conditions are collected using an accelerometer sensor with a sampling frequency of 20 kHz. The study utilises 12 statistical features, comprising 7-time domain features, namely mean, standard deviation, kurtosis, RMS, skewness, peak value, crest factor, and 5 frequency domain features, namely mean frequency, median frequency, spectral entropy, power spectral density, and spectral centroid. These features are selected using the ReliefF feature selection algorithm. The selected features are then employed as classification parameters. The results indicate that the most relevant statistical features used for classification parameters are RMS, standard deviation, and power spectral density. Meanwhile, the performance of the support vector machine is excellent for three cases of the induction motor faults. The accuracy for single faults, double faults, and multiple faults is 99%, 100%, and 99%, respectively.

Keywords: Induction Motor, Fault Diagnosis, ReliefF, Support Vector Machine, Vibration.

14.30 – 14.45 Parallel Season 1

Sub-Theme : Automation and Diagnostics For Enhanced Industrial Efficiency
Room : Malabar
Presenter : Kurniawan Dwi Yulianto

Combination of Discriminant Analysis and Minimum Redundancy Maximum Relevance for Induction Motor Fault Diagnosis Using Stator Current Signals

Kurniawan Dwi Yulianto¹, Didik Djoko Susilo¹, Purwadi Joko Widodo¹

Universitas Sebelas Maret¹

Abstract. Induction motors are critical components in various industrial applications. Any damage to these motors can seriously affect the production system. Therefore, early fault detection is essential to prevent such occurrences. This research aims to develop a fault diagnosis model for induction motors through the analysis of stator current signals using the Discriminant Analysis method. Raw signal data were obtained experimentally in the laboratory using two identical three-phase induction motors. There are eight different conditions categorized into a combination of single and multiple faults. Sixteen features were extracted from each signal, consisting of 11 time-domain features and 5 frequency-domain features. These features were selected using the minimum Redundancy Maximum Relevance (mRMR) algorithm. The selected features were then used as input to build a model using the Discriminant Analysis classification method in MATLAB software. The results indicate that the Discriminant Analysis model achieved very high accuracy across all condition classes. The computation time of the developed model is exceptionally fast, even below one second. Quadratic Discriminant Analysis (QDA) proved to be more accurate than Linear Discriminant Analysis (LDA) in classifying more complex fault data.

Keywords: Induction Motor, Fault Diagnosis, Discriminant Analysis, Minimum Redundancy Maximum Relevance, Stator Current Signal Analysis.

15.15– 15.30 Parallel Session 1

Sub-Theme : Automation and Diagnostics For Enhanced Industrial Efficiency
Room : Malabar
Presenter : Athina Ratum

Mobile Robot Selection Using AHP MOORA and Simulation Modelling for Material Handling Automation

Tifen Frederick¹, Athina S Ratum¹, Andira Taslim¹

President University¹

Abstract. Company XYZ is planning to reduce 40% material handling labor at their assembly area by the end of 2030. To achieve this objective, the company is considering mobile robot to automates the process of material handling. This research use Analytical Hierarchy Process (AHP) and Multi-Objective Optimization on the basis of Ratio Analysis (MOORA) to select the suitable mobile robot. Within the alternatives, the AMR is chosen with the highest yi value of 0.25 between all alternatives. The research study is also supported with the simulation & modelling analysis using FlexSim Software which conclude that by using 3 AMR and the proposed layout, operation procedure, and workflow, the material handling labor can be reduced by 47%. From financial perspective, this project has the Benefit Cost Ratio of 1.49, 10% Internal Rate of Return, and 6.10 years payback period.

Keywords: AHP, Autonomous Mobile Robot, Flexim, Material Handling, MOORA



15.30– 15.45 Parallel Session 1

Sub-Theme : Automation and Diagnostics For Enhanced Industrial Efficiency

Room : Malabar

Presenter : Joko Supriyono

Transformer-LSTM Deep Learning Model for Winding Temperature Prediction of Induction Motors in the Oil and Gas Industry: Enhancing Maintenance Strategies

Joko Supriyono¹, Imam Mukhlash¹, Mohammad Iqbal¹, Dhimas Anton Asfani¹

Institut Teknologi Sepuluh Nopember¹

Abstract. In oil and gas operations, induction motors are critical components, and operational reliability is paramount. This study proposes a hybrid deep-learning model for predicting winding temperatures in induction motors, which is a vital aspect of operational reliability in the oil and gas industry. The data were analyzed from four induction motors, each equipped with three stator winding temperature sensors, and collected at 1-min intervals from January 2021 to September 2024, yielding approximately two million data points for each motor. These motors, designed with Class F insulation, have a stage 1 alarm set at 250°F and a stage 2 trip at 285°F. The proposed model integrates the strengths of Transformer and LSTM networks to capture complex temporal dependencies and accurately forecast winding temperatures. Results demonstrate the model's effectiveness in predicting potential failures, which enables proactive maintenance strategies. This approach can significantly reduce unplanned downtime and associated costs, thereby optimizing maintenance operations and enhancing reliability in the oil and gas industry.

Keywords: Induction Motor, Winding Temperature, Transformer, LSTM, Predictive Maintenance

15.45– 16.00 Parallel Season 1

Sub-Theme : Automation and Diagnostics For Enhanced Industrial Efficiency
Room : Malabar
Presenter : Mochamad Arief Hidayat

Anomaly Detection for Carbon Capture Storage Facility using Markov Switching Models

Mochamad Arief Hidayat¹, Nur Iriawan¹, Gede Wibawa¹

Institut Teknologi Sepuluh Nopember¹

Abstract. Currently, climate change has become a hot topic issue and Carbon Capture and Storage (CCS) technology acknowledged as a feasible remedy. In order to avoid any disruptive into CCS facility and maintaining the operations of the CCS facility, Anomaly detection is utilized to identify potential issues before they escalated. Amine-based technology is selected for Carbon Capturing technology and lean amine pump one of key equipment to ensure its operations. The objective of this study is proposing a new method of Markov Switching Model (MSwM) for anomaly detection with case lean amine pump's vibration data. As result, in Auto Regression (AR) = 1 for 2 regimes, normal condition is indicated in regime 1 and regime 2 is indicated as anomaly regime. Probability transition from Regime 1 to Regime 2 is 1%. For AR=1 and 3 regimes case, regime 1 is indicated as anomaly and normal in regime 2.

Keywords: Anomaly Detection, Carbon Capture Storage, Markov switching Model , non linear time series, Amine.

16.00 – 16.10 Parallel Session 1

Sub-Theme : Automation and Diagnostics For Enhanced Industrial Efficiency
Room : Malabar
Presenter : Joni Welman Simatupang and Muhammad Rahman

Design Implementation of an Automated Guided Vehicle (AGV) System using Arduino Microcontroller and Radio Frequency (RF) Technology

Joni Welman Sipatupang¹, Muhammad Rahman¹, Erwin Parasion Sitompul¹, Iksan Bukhori¹, Antonius Suhartomo¹

President University¹

Abstract. Automated Guided Vehicles (AGVs) are utilized for transporting and processing products within factory settings. AGVs using magnetic stripes tend to encounter operational issues such as veering off lanes or magnetic stripe damage. Therefore, we seek a more reliable solution, resulting on design of an AGV using RFID technology to replace an infrared sensor. Three parameters were established for testing: steering angles, impact load, and battery endurance. Initial phase of experiment analyzed RFID tag readings using various PWM settings to gauge the AGV's movement and responsiveness, finding that a PWM setting of 100 resulted in optimal performance. Further analysis of motor driver error values at PWM 150 revealed potential challenges at higher settings, particularly with maximum error values of 1.50 in forward and 1.65 in reverse for the right motor driver, underscoring the need for precision optimization. Observations from steering angle tests indicated that without a load, the average turning angle for right turns was 89.65° with a 1.35° error, while left turns had an angle of 90.22° with a 2.02° error. With a 1 kg load, right turns showed an average angle of 89.25° with a 3.20° error, and left turns had an angle of 90.30° with a 2.49° error. The findings suggest that right turns are more precise than left turns without a load, but precision decreases significantly for both maneuvers when a load is added, especially for right turns.

Keywords: Automated guided vehicle (AGV), Pulse width modulation (PWM), Radio-frequency identification (RFID), Battery endurance.

13.30 – 13.50 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Koay Mei Hyie

Exploring the Impact of Pressing Techniques on Mycelium-based Biocomposites

Normariah Che Maideen¹, Koay Mei Hyie^{2,*}, Hamid Yusoff³, Johaikal Jamaluddin⁴, Johari Abdullah⁵, Norsila Abdul Wahab⁶ and Yose Fachmi Buys⁷

Universiti Teknologi MARA Cawangan Pulau Pinang^{1,2,3,4}, Universiti Sains Malaysia^{5,6}, Universitas Pertamina⁷

Abstract. Mycelium-based composite (MBC) as a new engineering biocomposite, is receiving numerous interest due to its environment sustainability. The study aimed to address the challenge of optimizing the physical properties of MBC for a more efficient production process. The study investigated the impact of hot or cold pressing, different pressing temperatures (120°C, 160°C, and 200°C), pressing pressures (low, medium and high) and sequences (before and after drying process) on the physical properties of MBC such as density, shrinkage, moisture content and hardness. Mycelium millets were mixed with kenaf, carbon carbonate, wheat bran and wheat flour. The pressing methods and sequences significantly affected the properties of the MBC. Cold pressing had no effect on reducing shrinkage and moisture content of MBC but improved density. Hot pressing increased shrinkage and hardness at higher temperature and pressure, with strong mycelium-substrate bonding observed in SEM images. The post processing sequence involving drying followed by pressing exhibited less shrinkage and controllable moisture content of MBC for better dimensional stability and quality control purpose. It was crucial to comprehend the efficient pressing techniques affected these physical qualities to optimize MBC for specific applications and ensure that it satisfied the demanding standards of companies looking for sustainable alternatives and cost-effective production.

Keywords: Mycelium; Biocomposite; Hot pressing; Cold pressing, Temperature.

13.50 – 14.05 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Arifina Febriasari

Characterization and Performance Study of PVDF-Graphene Oxide Membranes Fabricated Using Highspeed Homogenizer

Arifina Febriasari¹, Nina Arlofa¹, Supriyadi¹, Shohifah Annur¹, Ferry Ferdiansyah¹, Shafa Marwa¹, Muhammad Ridwan¹, Muhammad Bagas A Mahandika¹

Universitas Serang Jaya¹

Abstract. The efficiency of PVDF-GO membrane fabrication is still a challenge considering the GO dispersion process in membrane dope solution. This study aims to improve the efficiency of PVDF membrane fabrication through GO modification using a high-speed homogenizer. The addition of GO is expected to improve membrane performance, both in permeability and rejection ability. The fabrication method was carried out using a high-speed homogenizer to disperse GO evenly in the membrane dope solution. The resulting membrane was characterized using SEM-EDS to observe the morphology and distribution of elements, and FTIR to study changes in chemical structure. Comparisons were made between pure PVDF and PVDF-GO membranes. Membrane performance tests were carried out by measuring water permeability and percentage rejection of artificial waste. The results of this study are expected to show improvements in membrane fabrication efficiency and performance, as well as contribute to the development of more efficient membrane separation technologies.

Keywords: mixed matix membrane, polyvonylidine flouride, graphene oxide, membrane fabrication.

14.05 – 14.20 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Apif Miftahul Hajji

The Effect of PETE, HDPE, and LDPE Type of Plastic Waste as Additive on Compression Strength and Temperature Resistance of Architectural Lightweight Bricks

Apif M. Hajji¹, Bayu Firman Syah¹, Anie Yulistyrini¹

Universitas Negeri Malang¹

Abstract. The purpose of the study was to determine the effect of plastic waste on the compressive strength, water absorption, and temperature resistance of lightweight bricks for green architecture. This study is included in quantitative research using the Experimental method. The variations of plastic that will be used are PETE, HDPE, and LDPE plastic types, each of which is 10%, 20%, and 30% of the weight of cement. The test object made is a cylindrical lightweight brick with a diameter of 10.8 cm and a height of 5 cm. The mixture of lightweight bricks made includes cement, sand, foam agent, and water. After obtaining the compressive strength, water absorption, and temperature resistance values of each test object, it is then compared with the benchmark object, namely lightweight bricks without a plastic mixture to see if there is an effect of the plastic mixture. There is an effect of the plastic mixture on the compressive strength seen from the increase in compressive strength in lightweight bricks mixed with 10% PETE plastic. There is an effect of the plastic mixture on the water absorption seen from the increase in water absorption in lightweight bricks mixed with 10% PETE plastic. There is an effect of plastic mixture on temperature resistance as seen from the increase in compressive strength of lightweight bricks mixed with 30% HDPE plastic. It can be concluded that plastic can affect the quality of lightweight bricks and is suitable for highly recyclable materials that can be utilized in green architecture.

Keywords: plastic waste, compression strength, temperature resistance, lightweight bricks, architecture finishes

14.20 – 14.35 Parallel Season 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Ade Paramita

Synthesis of Activated Carbon Derived from Banana Peel for Application as a Catalyst Support in Fuel Cell

Adhe Paramita^{1,2,3}, Muthia Elma², Heru Setyawan¹, Aulia Rahma²

Institut Teknologi Sepuluh Nopember¹, Universitas Lambung Mangkurat², Institut Teknologi Kalimantan³

Abstract. The purpose of the study was to determine the effect of plastic waste on the compressive strength, water absorption, and temperature resistance of lightweight bricks for green architecture. This study is included in quantitative research using the Experimental method. The variations of plastic that will be used are PETE, HDPE, and LDPE plastic types, each of which is 10%, 20%, and 30% of the weight of cement. The test object made is a cylindrical lightweight brick with a diameter of 10.8 cm and a height of 5 cm. The mixture of lightweight bricks made includes cement, sand, foam agent, and water. After obtaining the compressive strength, water absorption, and temperature resistance values of each test object, it is then compared with the benchmark object, namely lightweight bricks without a plastic mixture to see if there is an effect of the plastic mixture. There is an effect of the plastic mixture on the compressive strength seen from the increase in compressive strength in lightweight bricks mixed with 10% PETE plastic. There is an effect of the plastic mixture on the water absorption seen from the increase in water absorption in lightweight bricks mixed with 10% PETE plastic. There is an effect of plastic mixture on temperature resistance as seen from the increase in compressive strength of lightweight bricks mixed with 30% HDPE plastic. It can be concluded that plastic can affect the quality of lightweight bricks and is suitable for highly recyclable materials that can be utilized in green architecture.

Keywords: plastic waste, compression strength, temperature resistance, lightweight bricks, architecture finishes



14.35 – 14.50 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Raudhah

Effects of Liquid Fraction Recirculation during Microwave-Assisted Hydrothermal Carbonization on Properties of Coffee Parchment

Raudhah¹, Rosdanelli Hasibuan², Irvan², Erni Misran²

Politeknik Negeri Lhokseumawe¹, Universitas Sumatera Utara²

Abstract. Coffee parchment (CP) is agricultural biowaste resulting from coffee processing, and they are often underutilized and end up in landfills, leading to unnecessary additional costs for waste management facilities. Hydrothermal carbonization (HTC) is an attractive approach to valorize wet biomass such as CP to valuable bioproducts. In this work, the HTC of CP was carried out in a modified conventional microwave at 70-110 °C for 60-180 min. The biomass to water weight ratio was 1:10, and the optimal conditions were explored. Next, the liquid fraction produced was recycled into the HTC process to maximize energy recovery. Following this, the surface morphology and functionality of this hydrochar were characterized by SEM and FTIR, respectively. In short, it can be concluded that HTC is an effective approach for producing potential hydrochar from CP and liquid fraction recirculation is a viable strategy for reducing water consumption.

Keywords: coffee parchment; hydrothermal carbonization; liquid fraction; microwave; recirculation.

14.50 – 15.05 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Viqry Pramananda

Performance of Dye-Sensitized Solar Cell (DSSC) Based on Black Glutinous Rice Extract and Banana Stem Activated Carbon at Various Dye pH

Erni Misran¹, Maya Sarah¹, Viqry Pramananda¹, Teuku Aufar Hadyan Fityay¹

Universitas Sumatera Utara¹

Abstract. The utilization of anthocyanin extract from natural sources in Dye-Sensitized Solar Cells (DSSC) has drawn concern from researchers. However, more research needs to be performed on how pH dyes affect DSSC performance. Furthermore, due to the price and availability of platinum (Pt), the investigation of carbon-based materials to substitute Pt in the DSSC counter electrode continues to be carried out. This research aimed to study the effect of anthocyanin's pH from black glutinous rice on the DSSC performance. Banana stem-based activated carbon was applied to the counter electrode. Anthocyanin was extracted by maceration using ethanol solvent, and its pH was adjusted to various pH (1, 3, 5, 7) using CH₃COOH and NaOH. The best DSSC performance was achieved using pH 1, with a voltage of 9,167 mV, a current of 3.53×10^{-3} mA, a power of 3.23×10^{-2} mW, and a power density of 5.17×10^{-3} mW/cm².

Keywords: Anthocyanin, DSSC, pH, black glutinous rice, power density



15.05 – 15.20 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : V. Tri Freebrina Harisetyawan

Indonesia's Energy Security Projection Towards 2060 Net Zero Emission Target

*V. Tri Freebrina Harisetyawan¹, Alfian Yudha Prihatmoko¹, Dovan Pujangga A Lanank Es¹,
Joko Santosa¹, Ari Nugroho⁶*

Badan Riset dan Inovasi Nasional¹

Abstract. The energy transition is essential to achieving Indonesia's Net Zero Emission (NZE) target by 2060 or earlier, as outlined in Law No. 16 of 2016 and the Enhanced Nationally Determined Contribution (ENDC). A critical aspect of this transition is ensuring national energy security, which is evaluated through availability, accessibility, affordability, and acceptability. Between 2016 and 2020, Indonesia's average energy security score was 6.39, falling into the "secure" category. This study projects the country's energy security in 2060 using indexation methods, analyzing energy supply-demand data from 2010 to 2022 and forecasts through 2060. The findings show an overall improvement in energy security, with acceptability increasing significantly from 100 to 1,126, while affordability declines from 100 to 83 due to rising energy prices. The study also analyzes each parameter's impact on energy security and electricity price. Moreover, it provides policy recommendations for a sustainable energy transition.

Keywords: energy security; availability; accessibility; affordability; acceptability; index; electricity price.

15.20 – 15.35 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Abdul Mudjib Sulaiman Wahid

A New Approach in Corrosion Study Using DFT and Monte Carlo Simulation to Investigate the Synergistic Effects Natural Green Inhibitor Citrus Sinensis and Synthetic Benzotriazole on Low Carbon Steel

Abdul Mudjib Sulaiman¹, M. N. Ilman¹

Universitas Gadjah Mada¹

Abstract. This study investigates the corrosion inhibition of low carbon steel using a synergistic blend of Citrus sinensis extract and 1H-benzotriazole. The inhibition efficiency was evaluated using Density Functional Theory (DFT) with the B3LYP/6-31G(d) basis set and Monte Carlo simulations. Quantum chemical parameters such as EHOMO, ELUMO, ionization potential (IP), and electron transfer (ΔN) were calculated. The results indicate that the mixed inhibitor provides superior corrosion protection compared to individual inhibitors, with adsorption energies of -20511.53 kcal/mol for the combination, significantly higher than -175.09 kcal/mol for Citrus sinensis and -10359.80 kcal/mol for 1H-benzotriazole alone. The combined inhibitor demonstrated enhanced electron donation, reducing the energy gap (ΔE) and improving the stability of adsorption on the steel surface. This suggests that the synergistic interaction of the inhibitors leads to a more efficient, sustainable corrosion protection method, offering an environmentally friendly alternative for steel protection.

Keywords: Corrosion inhibition, Citrus sinensis, 1H-benzotriazole, Density Functional Theory (DFT), Monte Carlo simulations

15.35 – 15.50 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials
Room : Online - Kamojang
Presenter : Muhammad Farhan

Effect of Extruder Temperature and Composition of PP, ABS, and Fiberglass on Physical Properties of Composite of 3d Printing Filament

Muhamma Farhan¹, Muslimin¹, Aini Zuhra Binti Abdul Kadir², R. Grenny Sudarmawan¹, Azam Milah Muhamad¹, Dhiya Luqyana¹

Politeknik Negeri Jakarta¹, Universiti Teknologi Malaysia²

Abstract. This study explores the impact of extruder temperature and the composition of polypropylene (PP), acrylonitrile butadiene styrene (ABS), and fiberglass on the physical properties of 3D printing filaments. As the demand for high-performance 3D printed components rises, understanding how these factors influence filament characteristics is essential for optimizing print quality and material performance. Filaments were produced using various ratios of PP and ABS, incorporating different percentages of fiberglass, and extruded at temperatures ranging from 180°C to 240°C. Standardized testing protocols assessed fundamental physical properties—including density, dimensional stability, thermal conductivity, and melting temperature. Findings indicated that both extruder temperature and composition significantly affected the physical properties of the filaments. Optimal extruder temperatures facilitated better mixing and bonding of materials, improving density and thermal characteristics. Additionally, the ratio of PP to ABS was critical in determining the filaments' dimensional stability and melting behavior. Statistical analysis revealed strong relationships between extruder settings, material composition, and the resultant physical properties, emphasizing the importance of precise control over these variables in filament production. This research provides valuable insights for developing optimized 3D printing materials, paving the way for enhanced performance in various industrial applications.

Keywords: 3D printing, Extruder temperature, Polypropylene (PP), Fiberglass, and Physical properties

15.50 – 16.05 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Nina Tania Lestari

Innovative Advanced Material Solutions for Integrated Safety Helmets in Mining

Rahmadhyla Dindakeysa Hartono¹, Nina Tania Lestari¹

Bina Nusantara University¹

Abstract. This research focuses on the development of a 3-in-1 personal protective equipment (PPE) design, which includes a safety helmet, visor, and earplugs, specifically aimed at mining applications. The objective of this study is to identify and address unique safety risks in mining environments, such as impact hazards, high noise levels, and particle exposure. The research methodology involves Failure Mode and Effect Analysis (FMEA) to identify potential failures and risks in the design. Additionally, field surveys and interviews with stakeholders, including miners and safety experts, were conducted to understand the needs and challenges faced on-site. The results yield a 3-in-1 PPE design that integrates safety, functionality, and comfort, focusing on comprehensive impact protection, incorporating a scratch-resistant visor and adjustable earplugs. Performance evaluation was carried out through simulation testing and field prototypes. Overall, this design development aims to enhance the effectiveness of worker protection in mining environments while considering ergonomic aspects for user comfort. Furthermore, this research contributes positively to the innovation of PPE in the mining sector, aligning with Sustainable Development Goals (SDGs) related to decent work and economic growth (SDG 8) and industry, innovation, and infrastructure (SDG 9), by creating more efficient and safe solutions to protect workers from potential risks in highrisk workplaces.

Keywords: Mining, Personal Protective Equipment, Safety Helmet , Visor, Earplug, Innovative Design, FMEA, Occupational Safety, SDGs.

16.05 – 16.20 Parallel Session 1

Sub-Theme : Advancements in Energy and Materials

Room : Online - Kamojang

Presenter : Muhamad Rhadia Rahman

Sustainable Biochar Production from Palm Kernel Shell through Slow Pyrolysis: A Life Cycle Assessment of its application as an Eco-Friendly Fertilizer

Andini Fikarda¹, Muhamad Rhadia Rahman¹, Yazid Bindar², Laksmi Dewi Kasmiarno^{1,2}

Universitas Pertamina¹, Institut Teknologi Bandung²

Abstract. Palm Kernell Shell (PKS) as biomass waste can be converted into more valuable products. In this study, PKS was subjected through pyrolysis process at various temperatures 300°C, 400°C, 450°C, 500°C, 550°C, and 600°C using a fixed-bed reactor. The research focuses on biochar production of PKS via slow pyrolysis and assesses the life cycle impact of biochar as a substitute for commercial fertilizer, aiming to determine the influence of temperature variation on biochar properties, and to compare greenhouse gas (GHG) emissions between biochar-based and conventional fertilizers. The OpenLCA software was employed to conduct the life cycle assessment (LCA). The optimal temperature for biochar production through slow pyrolysis process was found to be 450oC, yielding a carbon-to-nitrogen (C/N) ratio of 19.4. The study also analyzed the GHG emissions across the biochar production from PKS lifecycle, from oil palm cultivation to crude palm oil (CPO) milling and biochar synthesis using slow pyrolysis process (cradle-to-gate). Substituting commercial NPK fertilizers with biochar in oil palm cultivation resulted in reductions in GHG-related impacts, specifically in global warming potential, acidification, eutrophication, and ecotoxicity by 3.6%, 20.7%, 10.7%, and 2.7% respectively.

Keywords : *Biochar, Palm Kernell Shell, slow pyrolysis, greenhouse gases, LCA.*

13.30 – 13.45 Parallel Season 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices
Room : Online - Halimun
Presenter : Intan Mahardika

Design Optimization of Cold Air Intake (CAI) System with Butterfly Valve for Enhance Engine Performance and Efficiency: A Mitsubishi Lancer Evo VIII Study Addressing SDG 9.4 and 12

Immanuel Johanes Aditya¹, Zener Sukra Lie¹, Intan Mahardika¹

Bina Nusantara University¹

Abstract. The car's performance generally improves with increased engine combustion efficiency. The volumetric air flow rate entering the intake manifold was significantly improved by replacing the stock air filter in the Cold Air Intake (CAI) system and adding a butterfly valve. The butterfly valve manages the amount of air intake based on the vehicle's speed. The CAI design compared the volumetric airflow rate per minute results from the calculation and flow bench prototype testing either before re-design, after implementing CAI, or after adding the butterfly valve. The result shows a significant increase in adding a butterfly valve, which is 38.35 Hp and the maximum torque is 429.13 Nm. The temperature sensor in the intake system indicates a maximum decrease of three degrees Celsius in air temperature before the intercooler. This enhancement potentially drives innovative progress in the automotive sector, supporting the Sustainability Development Goals (SDG) 9.4 and 12 for 2030.

Keywords: Butterfly Valve; Cold Air Intake; Engine Performance; Intake Efficiency

13.45 – 14.00 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices
Room : Online - Halimun
Presenter : Bayu Ardiansyah

Optimized Design for the Flaps Folder Fabrication of Carton Sealer Machine by Automation

Bayu Ardiansyah¹, Lydia Anggraini¹

President University¹

Abstract. This research presents the design and implementation of an automatic flap folding system for a carton sealer machine in one of the beverage manufacturing industries in Indonesia. The system eliminates limitations of human inefficiency in the existing manual folding process, to improve production capacity and reduce product defects. The design prioritizes affordability by utilizing a stepper motor controlled by an Arduino Uno microcontroller. This creates a fully electric system, eliminating the need for investment in additional compressors and air tubes. Fabrication uses available materials in the company workshop, with a total cost of 7,243,452 IDR. Testing shows us that the maximum capacity for the automatic flap folding system is 36 cartons per minute, which exceeds the current capacity of the carton sealing machine. This increases production capacity by 58%, from 19 cartons/minute to 30 cartons/minute. Furthermore, the present research has significant cost savings compared to purchasing new carton sealers with automatic flap folders. The design is a cost-effective alternative, with potential savings of 45,000,000 IDR per machine if the company mass produces the system.

Keywords: Carton sealer, Automatic flap folding system, Stepper motor, Arduino Uno, Production capacity.



14.00 – 14.15 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices

Room : Online - Halimun

Presenter : Siti Nur Amalina Mohd Halidi

Multifactorial Contributors to the Effectiveness of a Mobile Solar Dryer

Siti Nur Amalina Mohd Halidi¹, Arie Sukma Jaya², Mahfuzah Zainudin¹, Nor Shamimi Shaari¹, Nor Suhada Abdullah¹

Universiti Teknologi MARA Cawangan¹, Universitas Pertamina²

Abstract. The ever increasing global population has affected food security in various ways. Dehydrating crops serves as one of the method to preserve food and improving its shelf life. This paper discusses the various parameters that can contribute to the effectiveness of a mobile solar dryer. Parameters studied include wall pattern, wall colors, tray design and crop thickness. The dryer is placed in an area with ample sunlight with its temperature and humidity measured. It is found that wall pattern has little effect on the effectiveness while all other studied parameters affect the dryer in various ways. Light colored walls are preferred over dark colors, metal trays are best used for drying crops, and crop thickness only serves as a reference to a specific crop used depending on the customer's needs.

Keywords: Dryer, Solar, Thermal Effectiveness.

14.15 – 14.30 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices
Room : Online - Halimun
Presenter : Hamid Yusoff

Enhancing the Biological Efficiency of White Oyster Mushrooms Through Optimization of Light-Emitting Diodes using Response Surface Methodology

Siti Nur Fathiha Abdullah¹, Hamid Yusoff², Normariah Che Maideen², Koay Mei Hyie², Sh Mohd Firdaus Sh Abdul Nasir², Alif Farhan Mohd Yamin², Noni Soraya Sambudi³

Jabatan Pendidikan Tinggi¹, Universiti Teknologi MARA², Universitas Pertamina³

Abstract. White oyster mushrooms are recognized for their culinary value and health advantages. Nevertheless, irregular yields and variations in size because of differing lighting conditions in traditional cultivation facilities pose difficulties. This research aimed to determine the optimal lighting conditions using light-emitting diodes (LEDs) to maximize biological efficiency (BE) and maintain desirable physical attributes of the fruiting bodies. The analysis of variance (ANOVA) revealed the substantial influence of LED settings on the physical size of the mushroom fruiting bodies. Through the application of Central Composite Design (CCD), the developed model predicted a BE of 74.91%. This optimal BE was achieved at a lighting intensity of 600 lux and a lighting exposure period of 13.34 hours per day. The statistical equation model demonstrated a minor average error of 6.72% when comparing the projected and observed BE values. This study holds significant importance as it can potentially enhance biological performance and increase the production of white oyster mushrooms.

Keywords: biological efficiency (BE); light-emitting diode (LEDs); optimization; response surface methodology; white oyster mushrooms.

14.30 – 14.45 Parallel Season 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices
Room : Online - Halimun
Presenter : Frisca Lovitasari

Thermodynamic Analysis of Steam Turbine Performance Before and After Overhaul Process at PT Geo Dipa Energi (PERSERO) Unit Patuha

Fayza Yulia¹, Frisca Lovitasari¹, Sahrul Azis¹, Wisnu Indrawan²

Universitas Pertamina¹, Universitas Esa Unggul²

Abstract. Patuha Geothermal Power Plant is a 60MW power plant that operates using a dry steam cycle. This study aims to determine the impact of overhaul on turbine performance by analyzing the first and second laws of thermodynamics, to assess the influence of ambient temperature on turbine performance, and to predict turbine performance when the ambient temperature exceeds the maximum operational temperature of the plant using a backpropagation neural network in MATLAB software. After the overhaul, turbine performance, as measured by work output, power output, isentropic efficiency, and exergy efficiency, showed improvements of 20.53 kJ/kg in work output, 2550.93 kW in power output, 1.35% in isentropic efficiency, and 0.82% in exergy efficiency. It was also demonstrated that ambient temperature affects turbine performance, as indicated by the increase in condenser temperature and pressure with rising ambient temperature. Furthermore, turbine performance is predicted to decrease more significantly when the ambient temperature exceeds the maximum operational temperature of the plant."

Keywords: Geothermal power plants, dry steam cycle, overhaul, turbine, thermodynamics, backpropagation, neural networks

14.45 – 15.00 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices

Room : Online - Halimun

Presenter : Halim Bin Ghafar

Prolonged Drying of Sponge: A Comparative Study of Natural Convection Solar Dryer and Open Sun Drying Techniques

Halim Ghafar¹, Hamid Yusoff¹, Sh Mohd Firdaus Sh Abdul Nasir¹, Kay Dora Abdul Ghani¹, Mohd Azmi Ismail¹, Sylvia Ayu Pradanawati¹

Universiti Teknologi MARA Cawangan¹

Abstract. This study investigates the effects of prolonged drying using both a natural convection solar dryer and open sun drying. The solar dryer, measuring 1m in width, 1.5m in length, and 0.5m in height, was used continuously for 44 hours starting from 10 am. The primary objective was to analyze and compare the drying kinetics and efficiency of the two methods in reducing the moisture content of the drying object. Parameters such as temperature, humidity, and weight loss of the sponge were monitored throughout the experiment to understand the drying behaviour. Results demonstrated significant differences in moisture reduction, highlighting the advantages and limitations of the natural convection solar dryer for long-term drying processes. These findings contribute to the optimization of drying time and the broader application of sustainable, energy-efficient drying technologies in various industrial and agricultural contexts.

Keywords: Solar dryer, open sun drying, natural convection, drying rate, prolonged drying.



15.00 – 15.15 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices

Room : Online - Halimun

Presenter : Prof. Dr. Any Sutiadiningsih, M.Si

Herbal Processing Machine Analysis with DEM Aproach to Optimizing Mixing Process

Any Sutiadiningsih¹, Ila Huda Puspita Dewi¹, Andita Nataria Fitri Ganda¹, Joko Suwito¹, Agung Prijo Budijono¹

Universitas Negeri Surabaya¹

Abstract. Herbal medicine, widely consumed in Indonesia, faces challenges in production, particularly in the mixing process, which affects product quality and efficiency. This study aims to analyze the herbal mixing process using Discrete Element Method (DEM) simulation to optimize the production of crystallized herbal medicine. Focusing on traditional herbal products, such as red ginger-based instant herbal medicine, the production stages include washing, grating, squeezing, and cooking. The mixing process plays a critical role in determining the final product quality. DEM simulation results reveal that the mixing volume and density are 0.000452 m^3 and 11.061 kg/m^3 , respectively. The optimal mixing speed is 0.114 m/s , with a torque of 17.32 Nm and total power of 0.038 HP . These findings demonstrate the potential of DEM in improving efficiency and product consistency in herbal medicine processing. The study provides valuable insights for small-scale producers transitioning from conventional to automated methods.

Keywords: Herbal Processing, DEM Simulation, Mixing Process, Optimization, Traditional Medicine

15.15 – 15.30 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices
Room : Online - Halimun
Presenter : Susi Tri Umaroh, S.Pd., M.Pd.

Numerical Analysis of Soybean Grinding Machine to Evaluate Contact Behavior Loading Material Among Hooper and Roller Grinding

Djoko Suwito¹, Wahyu Dwi Kurniawan¹, Muhammad Syarifuddien Zuhrie¹, Susi Tri Umaroj¹, Agung Prijo Budijono¹

Universitas Negeri Surabaya¹

Abstract. This study presents a numerical analysis of a soybean grinding machine, aimed at evaluating the contact behavior between loaded material and machine components, particularly the hopper and roller grinding parts. Tempe, a widely recognized plant-based protein source, is primarily produced through traditional methods, which often compromise hygiene and efficiency. Given that Indonesia is the largest tempe producer, there is an urgent need to enhance production processes. A modeling approach was utilized to simulate the interaction between soybean particles and machine components, focusing on material loading, stress distribution, impact velocity, and collision behavior. Results indicate that materials experience significant force reactions upon collision, with maximum stress reaching 347.33 MPa, a mass flow rate of 0.3 kg/s, and a vertical velocity of 3.25 m/s. The analysis tracked 4,321 particles, revealing non-homogeneous cracking of soybeans. These findings provide insights into optimizing tempe production, contributing to improved efficiency and product quality.

Keywords: Soybean grinding machine, Numerical analysis, Contact behavior, Material loading

15.30 – 15.45 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices

Room : Online - Halimun

Presenter : Mega Widias Putri

Numerical Analysis Of The Effect Of Water Cooling Method On Temperatre Distribution And Efficiency Of Photovoltaic

Mega Widias Putri¹, Ary Bachtiar Krishna Putra¹

Institut Teknologi Sepuluh Nopember¹

Abstract. Technological progress continues, although fossil fuels still serve as the primary energy source despite their detrimental environmental impacts. Photovoltaic (PV) cells convert sunlight into electricity; however, absorbed radiation increases temperature, which negatively affects the efficiency and reliability of PV systems. To combat this, various cooling systems have been developed, including the Photovoltaic Thermal (PVT) system. This study evaluates the performance of PVT systems under different conditions, such as tube diameter and flow rates, aiming to enhance thermal efficiency. Results indicated that the maximum electrical efficiency (EE) of 16% is achieved at a flow rate of 0.009 kg/s with a tube diameter of 9 mm. Meanwhile, the peak thermal efficiency (TE) of 81% occurs at a flow rate of 0.001 kg/s with a tube diameter of 12 mm. Utilizing zigzag tube channels in water-based PVT systems may significantly improve both average thermal efficiency and overall PVT performance.

Keywords: Photovoltaic, Temperature, Efficiency, Cooling System, Photovoltaic Thermal



15.45 – 16.00 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices

Room : Online - Halimun

Presenter : Dr. Nur Ahmad Arief, S.Pd., M.Pd

Airflow Inspection to Alacrity Device to Optimize Natural Cooling Reducing Heat Inside the Hardware

Nur Ahmad Arief¹, Nurhayati¹, Testa Adi Nugraha¹, Andre Dwijanyo Witjakson¹, Susi Tri Umaroh¹, Bidya Nur Habib¹

Universitas Negeri Surabaya¹

Abstract. This research aim to investigate airflow condition inside the device to avoid heat generation. Using fluid analysis method to investigate airflow inside the device. The result showed that The highest pressure of 0.118 MPa occurs in areas 0,05 and 0,074 m with airflow speeds of 1.33 m/s and 2.15m/s. The lowest pressure, which is 0.103 Mpa, occurs in an area of 0.022 m with a air speed of 1,100 m/s. When the air speed is 1.40 m/s, the pressure that occurs in the surrounding area is detected in the range of 0.107 – 0.158 MPa. The largest pressure value is in the area of 1.00 m with a value of 0.178 MPa. While the lowest pressure value is in the area of 0.22 m with a pressure value of 0.107 MPa

Keywords: alacrity, airflow inspection, optimize design.

16.00 – 16.15 Parallel Session 1

Sub-Theme : Optimized Engineering Solution for Sustainable Industrial Practices
Room : Online - Halimun
Presenter : Muktar Sinaga

Systematic Literature Review of Ice Slurry Compounds: Viscosity Characteristics, Heat Transfer and Applications

Muktar Sinaga¹, Jemie Muliadi²

Universitas Indonesia¹, Pusat Riset Kecerdasan Artifisial dan Keamanan Siber (PRKAKS-BRIN)²

Abstract. Refrigeration technologies are becoming increasingly crucial in engineering due to their broad applications and the growing demand for energy-efficient, environmentally sustainable solutions. Ice slurries are particularly notable for their high efficiency and sustainability. Comprised of fine ice crystals suspended in a non-Newtonian fluid, the composition of ice slurries plays a key role in determining their thermal performance. This systematic literature review (SLR) explores essential factors such as latent heat, ice packing factor (IPF), and ice crystal formation. It also investigates how variations in freezing point depressants affect heat transfer properties and viscosity stability, with a specific focus on the role of nanoparticles in improving thermal conductivity and the stability of ice slurry mixtures. The findings highlight the significant impact of composition and IPF on the efficiency of ice slurries, offering valuable insights into recent technological advancements and their contribution to enhancing energy efficiency in various cooling applications.

Keywords: ice slurry; latent heat; ice packing factor (IPF); viscosity; applications

Wednesday 7th

13.30 – 13.45 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Aulia Afifatuz Zulfah

The Influence of Different Initial Relative Densities and Ambient Temperature Ranges on MICP Treatment Using Direct-Mixing Injection Method

Aulia Afifatuz Zulfah^{1}, Rangga Adiprima Sudisman², Sifra Dovanka Trista Wewengkang¹, and Suharti Sastroredjo³*

Universitas Pertamina¹

Abstract. Microbially induced calcite precipitation (MICP) is a promising alternative method for improving the geotechnical properties of granular soils. The effectiveness of the MICP technique depends on a number of variables, including relative density and temperature. The objective of this study was to determine the effect of different initial relative densities and ambient temperature ranges on the effectiveness of MICP. After 300 and 600 hours of MICP treatment, with injection cycles occurring every 12 hours, it was found that specimens with a relative density of 34.5% were effectively cemented. In contrast, specimens with a relative density of 59.8% were not cemented. The percentage of cemented specimens was found to be greater (52.4%) in specimens cured at warmer ambient temperatures (20-28°C) compared to only 15.7% in specimens cured at cooler temperatures (16-24°C). These results suggest that the looser soil matrix and warmer curing temperature facilitated CaCO₃ precipitation and resulted in greater cementation.

Keywords: Soil Improvement; MICP; Bio-cementation; Relative Density; Temperature.

13.45 – 14.00 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Sifra Dovanka Trista Wewengkang

Experimental Analysis of Bio-cementation Effectiveness on Silica Sand with Varying Initial Water Content

Sifra Dovanka Trista Wewengkang^{1}, Rangga Adiprima Sudisman¹, Aulia Afifatuz Zulfah¹, Arlyn Aristo Cikmit¹*

Universitas Pertamina¹

Abstract. Bio-cementation is a binding process in granular soil particle pores using ureolytic bacteria as the main ingredient. Environmental parameters around it are affecting the bacteria's activity, including soil water content. The purpose of the study is to evaluate the initial water content effect on the cementation process in silica sand on a laboratory scale. The sand was placed in an acrylic box with dimensions of 15x10x11 cm³ and perforated drainage on the left and right sides. It was prepared in three different conditions: dry, partially submerged, and fully submerged. Each sandbox receives periodic injections containing *Sporosarcina pasteurii* and cementation reagents for a maximum of 15 days. After which, the distribution of cementation products was visually examined, and the proportion of calcium carbonate was measured. The findings revealed that the initial water content influenced the efficiency of bio-cementation.

Keywords: Bio-cementation; Calcium Carbonate; Initial Water Content; Silica Sand; Soil Improvement.

14.00 – 14.15 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Krismaya Hardianti

Analyzing the Potential and Feasibility of Tidal Energy in the Capalulu Strait: Quantitative Methods and Energy Availability Analysis

Akhdanizar Rafli^{1}, Anthoni Utomo², Krismaya Hardianti³, Rizani Rusli⁴, Lista Utami⁵, Dheo Alfarisi⁶, Ahmad Fathoni⁷*

PT. Utomo Juragan Atap Surya Indonesia,

Abstract. Currently, the development of tidal energy worldwide is progressing rapidly. Along with the growing issue of global warming that encourages the limitation of hydrocarbon fuel usage. This research aims to analyze the potential and feasibility of implementing tidal energy technology in the Capalulu Strait, North Maluku. This research involves two main aspects: methods for measuring flow velocity and analyzing energy availability. This research identifies two potential locations at coordinates 1°52'11"S, 125°19'36"E and 1°53'16"S, 125°20'0"E. The financial analysis produces an electricity output of 116,753 MWh over 25 years for location 1 and 110,422 MWh for location 2. Using the LCOE calculation method, the financial analysis shows an electricity price of IDR 17,729/kWh for location 1 and IDR 18,746/kWh for location 2. This price is still far above the selling price of electricity, which must be below or equal to the national supply cost of IDR 1,027.70/kWh.

Keywords: tidal energy, global warming, Capalulu Strait, financial analysis, LCOE



14.15 – 14.30 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Krismaya Hardianti

Identify the Importance of Renewable Tidal Power Generations and Challenges

Muhammad Rizky Chandra^{1}, Krismaya Dwi Hardianti², Anthony Utomo³, Muhammad Rizani Rusli⁴, Dheo Al Farisi⁵, Ayu Lista Utami⁶, Ahmad Nur Fathoni⁷*

PT. Utomo Juragan Atap Surya Indonesia,

Abstract. Tidal Energy is a form of renewable energy that harnesses the movement of tidal flows in the sea to generate electricity. This energy is derived from the gravitational forces of the moon and the sun, which cause fluctuations in sea surface levels. This paper aims to assess the significance of renewable energy, particularly tidal energy, and the challenges associated with developing tidal power plants. The main advantage of Tidal Power Plant (TPPs) is their predictability and stability. However, the development, potential negative impacts on marine ecosystems, limitations in suitable installation locations, and the need for more efficient technology. Tidal energy plays a crucial role in energy sustainability, replacing fossil fuels, especially in Indonesia, which has a tidal current potential of 60 GW with current reaching 7m/s.

Keywords: Tidal Energy, Renewable Energy, Energy Stability, Environmental Impact, Challenge



14.30 – 14.45 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Helmi Setia Ritma Pamungkas

Dynamic Simulation of Slope Stability in the Zero Point Area of Ciliwung

Solihin¹, Muhammad Agus Karmadi¹, Helmi Setia Ritma Pamungkas^{1}*

Pakuan University

Abstract. The Ciliwung Zero Point area has tea plantation land cover, with volcanic rock constituents and steep slopes that will affect slope stability. The method used is hand boring and soil properties also analysis of safety factor values with GEOSLOPE/W 2012 software. The results of the no-load slope safety simulation show that with a groundwater table depth of ± 1 m (fk slope 1.910), ± 5 m (fk slope 2.013) even in water-saturated soil conditions (fk slope is 1.558), the slope safety factor is still stable. However, the slope with a load on it of 100 kg/cm², with a groundwater level depth of ± 5 m (fk slope is 0.818) and ± 1 m (fk slope is 0.696), as well as the condition of the slope soil saturated with water (fk slope is 0.488), the value of the slope safety factor is unstable. Changing the land cover from tea vegetation to vegetation with heavy loads will increase the slope load.

Keywords: Simulation, Slope stability, Zero Point, Ciliwung

15.00 – 15.15 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Adita Utami

Analysis of Road Deterioration on National Road 12 Kemang-Bogor Using Bina Marga and Dirgolaksono & Mochtar Methods to Determine Appropriate Road Improvements

Adita Utami^{1*}, Viona Sefalifta²

Universitas Pertamina

Abstract. Roads as transportation infrastructure are essential for Indonesia's economic, social, and cultural relations. The growth of motorized vehicles in West Java increases the risk of road damage and driving inconvenience. Heavy vehicles and lack of drainage maintenance also contribute to road deterioration. Road condition surveys in West Java show most are in moderate or poor condition. Despite its importance, the Jakarta-Bogor road section experiences damage, primarily due to heavy vehicles. Evaluation methods like Bina Marga and Dirgolaksono & Mochtar are utilized to assess and select appropriate repairs. This study compares these methods to determine effective repair strategies. The analysis reveals differences in road damage evaluation between Bina Marga and Dirgolaksono & Mochtar. Bina Marga focuses on Average Daily Traffic (ADT) as the primary factor, while Dirgolaksono & Mochtar consider drainage conditions and driving quality. Both methods yield different damage values. Bina Marga suggests periodic maintenance to improve the road surface layer because both sections have a damage value 18. At the same time, Dirgolaksono & Mochtar suggest improvements based on the specific conditions of each segment. Still, if the drainage condition value is >25, it is necessary to prioritize drainage improvements such as at STA 1+500 - 1+600 (Bogor to Jakarta route). This conclusion confirms the need for the evaluation of drainage conditions.

Keywords: Road deterioration; Bina Marga; Dirgolaksono & Mochtar; Road Sections; Average Daily Traffic (ADT).

15.30 – 15.45 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : N. B. Laksono

Development of a Conceptual Framework for 'BEST: Bridge E-Maintenance Smart Tools' – An Integrated System Combining Knowledge Management and Digital Twin Technology

N. B. Laksono¹, Y. Latief¹, B. Trigunarsyah¹

Universitas Pertamina

Abstract. Concrete bridges, often considered the lifeline of transportation networks, face increasing risks due to aging infrastructure and inadequate maintenance strategies. To address these challenges, this study proposes a WBS-based e-maintenance system that integrates Knowledge Management (KM) and Digital Twin technology, aimed at revolutionizing the maintenance and preservation of concrete bridges. The research adopts a PRISMA-based systematic review approach to comprehensively identify and analyze existing studies related to Digital Twin technology and Knowledge Management in bridge maintenance. By synthesizing the findings, the study develops a conceptual framework that integrates these technologies into a cohesive maintenance strategy. The framework leverages a Work Breakdown Structure (WBS) to organize maintenance tasks, real-time monitoring via Digital Twin models, and a KM system to optimize the use of data and decision-making. The system is designed to enhance proactive maintenance, improve real-time data exchange, and foster knowledge sharing among stakeholders. The feasibility and effectiveness of the proposed framework are assessed through simulations and case studies on selected bridges. The results are expected to contribute significantly to optimizing bridge maintenance practices, enhancing sustainability, safety, and cost-efficiency in infrastructure management in the digital era.

Keywords: Digital Twin; Knowledge Management; Bridge Maintenance; Work Breakdown Structure; PRISMA

15.45 – 16.00 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Ahmad Taufik

Forensic Engineering For Offshore Pipeline Accident Investigation

Ahmad Taufik¹

PT. Fortasindo¹

Abstract. Offshore pipeline accident has great impact on safety, environment and business aspects because oil and gas pipeline upon leak would cause hydrocarbon release and raises to the sea surface and when within flammable limit it would catch fire or get explode when ignited. A subsea oil pipeline accident in East Kalimantan (2018) and many other areas recall of about forensic engineering methodology used for the accident investigation. Forensic engineering is an engineering discipline that embraces all related science and technology of accident investigations and root causes failure analysis, laboratory test and computer simulations to determine the root cause of pipeline failure or accident. Because lays in open sea, the pipeline accident many times involving the third party damage, therefore the forensic engineering also helps to determine the people or party who are responsible for and brought them to justice. In this paper the offshore pipeline accident road map with various analysis and diagnostic tools of forensic engineering is introduced and discussed.

Keywords: Forensic Engineering, Root Cause Failure Analysis, Accident Investigation, Offshore Pipeline, Pipeline Integrity.

16.00 – 16.15 Parallel Session 2

Sub-Theme : Integrative Solutions for Sustainable Energy and Infrastructure Resilience
Room : Offline - Papandayan
Presenter : Janthy Trilusianthy Hidayat

Assesing the Sustainability Status and Sustainable Settlement Development in Periurban of Jabodetabek Metropolitan Area

Janthy Trilusianthy Hidayat¹, Mujio¹, Heri Apriyanto¹, Nur Handayani¹

Pakuan University¹

Abstract. In developing countries, fast-growing populations, urbanization, and rising economic sectors cause a vast demand for settlement areas. Consequently, in able to deliver those demands, development in periurban of metropolitan area is inevitable. In periurban of Jabodetabek Metropolitan Area, some rapid developments tend to happen in Bekasi Regency, where the research location is South Cikarang District, it provides the space for settlement development. Later, the dynamic change of land use also occurs, following the rapid expansion of industrial area that it's growth process leads to unsustainability. Sustainable settlement development in Jabodetabek Metropolitan area is influenced by dynamic conditions on its periurban area. Methods used were spatial analysis, Multi Dimentional Scaling (MDS), descriptive analysis. The research result showed that sustainable status fairly sustainable and in the context of sustainable settlement development, consistency is needed in the implementation of related regulations, suppressing the rate of population immigration and increasing the area's capacity.

Keywords: Settlement, Sustainable settlement development, Sustainability status, Periurban area, Multi Dimentional Scaling (MDS)

13.30 – 13.45 Parallel Season 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design
Room : Offline - Galunggung
Presenter : Ghany Heryana

Powertrain and Integration Analysis of a Small Converted Electric Multi Purpose Vehicle with Finite Element Method

Ghany Heryana¹, Nanang Ali Sutisna¹

President University¹

Abstract. When the EV era begins, it is predicted that many ex-ICE vehicles will no longer be allowed to be used. Unless the vehicles are converted into Evs. In this study, a 1500 cc class MPV is converted into an EV with a 10 KW motor. The manual transmission is still used. It begins with analyzing the vehicle's power needs and determining the specifications of the devices used. The power is transmitted through the gearbox via an adapter. Designing the adapter is an effort in itself, followed by a strength analysis using the FEM. The conversion was successfully carried out, and the vehicle could run well, with the electrical components functioning without errors. The hypothesis is that the vehicle can reach speed up to 100 km/h with a range of 100 km on a single charge. The optimization can be continued by directly coupling the motor to the differential.

Keywords: Converted ICE, Electric Vehicle, FEM, ICE, EV

13.45 – 14.00 Parallel Session 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design

Room : Offline - Galunggung

Presenter : Fathan Maulana Akbar

Static and Dynamic Stability Performance in a Two-Legged Wheeled Self-Balancing Robot Platform

Fathan Maulana Akbar¹, Arie Sukma Jaya¹

Universitas Pertamina¹

Abstract. This study develops a scaled model of a two-legged wheeled self-balancing robot for potential use in industrial goods transportation within narrow, crowded, and confined spaces. Automated Guided Vehicles (AGVs) face significant challenges in maneuverability, particularly in tight areas and on uneven surfaces. To address these limitations, the research focused on designing a robot with enhanced flexibility and speed. The stability of the robot was managed using a PID control method and evaluated through static and dynamic stability tests. Static stability ensured the robot remained upright, while dynamic stability was tested by observing its movement under various conditions, including small disturbances. The study also explored the impact of different servo angles on the robot legs. Results showed the robot achieved optimal balance, with a 78% Duty Cycle in undisturbed conditions and 98% with disturbances, performing best at servo angles of 45 degrees without disturbance and 30 degrees with disturbance.

Keywords: Two-legged wheeled, self-balancing, robot, stability, PID control

14.00 – 14.15 Parallel Session 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design
Room : Offline - Galunggung
Presenter : Putu Mega Dana

DESIGN OF HVAC SYSTEM WITH ANALYSIS OF THERMAL COOLING LOAD AND AIR DUCT SIZE IN THEATER BUILDING

Fayza Yulia¹, Putu Mega Dana², Yustinus Bram Adi Prakoso³, Kevin David Lokollo⁴, Raden Wisnu W Partakusuma⁵

Universitas Pertamina^{1,2,3,4,5}

Abstract. The building sector accounts for 25% of energy consumption and carbon dioxide emissions. In the energy consumption sector of a building, HVAC systems can consume up to 50% of the total energy. This high number indicates the need to design an effective HVAC system according to the needs of a building. Therefore, this study focuses on estimating the thermal load of public buildings, especially theater buildings, which aims to determine the optimal cooling load requirements and distribution of air conditioning equipment to ensure comfortable operation and optimal air distribution. HVAC systems for theater buildings are designed by analyzing thermal cooling loads and air duct sizes. The design method includes analysis of cooling load, design of air duct layout, calculation of air duct area and equivalent diameter, and selection of air duct size based on SMACNA standards. In general, this building consists of the 1st floor, 2nd floor (Pilotis area), and the stage is subdivided into 4 zones based on space dimensions, occupancy, roof height, and heat sources (sensible heat and latent heat). This Theater Building is designed to operate from 18.00 to 23.00 with a capacity of 372 people. The building is designed to cool indoor air to 22°C and humidity to 65%. The air conditioning system is designed to circulate air in the temperature range of 12.8°C with the largest duct diameter being in section A, which is 79.8 in or 90 x 60 inches. Through the precise design of HVAC systems, not only are cooling needs optimally met, but a more sustainable environment with lower carbon emissions and better thermal comfort is created.

Keywords: HVAC, Cooling Load, Air Ducts, Layout, Air Duct Size

14.15 – 14.30 Parallel Session 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design
Room : Offline - Galunggung
Presenter : Nur Annisa Bahar

Analysis of Steam Turbine Generator Overhaul for Efficiency Enhancement at The Power Plant Center of Refinery Unit

Nur Annisa Bahar¹, Byan Wahyu Riyandwita¹, Septian Jamaluddin Zakky¹

Universitas Pertamina¹

Abstract. The petroleum production process emphasizes the importance of inspection, analysis, test planning, and providing feedback on rotating equipment. This study discusses the analysis of steam turbine generator overhaul for efficiency enhancement at the power plant center of refinery unit. The focus of overhaul in rotating equipment maintenance is to improve the efficiency of the steam turbine generator. Using the method of calculating the efficiency of the ideal and actual conditions of the Rankine cycle based on data before and after overhaul, an increase in efficiency of 2.63% and deviations in the entropy temperature diagram indicating the occurrence of energy loss due to the buildup of scaling and seal strip clearance, so that the quality of water for steam turbine generators must be considered by checking water demineralization, periodic maintenance, and the use of anti-scaling chemicals to avoid overhauls that require large costs and long time.

Keywords: Efficiency, Entropy, Inspection, Maintenance, Turbine

14.30 – 14.45 Parallel Session 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design
Room : Offline - Galunggung
Presenter : Mohamad Zaki Azizi

Strategic Innovation: Exploring Digital Transformation and Ambidexterity in the Automotive Components Industry

Mohamad Zaki Azizi¹, Syarifa Hanoum¹, Jerry Dwi Trijoyo Purnomo¹

Institut Teknologi Sepuluh Nopember¹

Abstract. The automotive components industry is undergoing a significant digital transformation, driven by the need to integrate modern technologies across business operations and vehicle manufacturing. This transformation is pivotal for enhancing innovation performance and maintaining competitive advantage. This study investigates the impact of digital transformational capability on innovation performance within this industry, with a particular focus on the mediating role of organizational ambidexterity. Using partial least squares structural equation modeling (PLS-SEM), the study tests four hypotheses: digital transformational capability influences both organizational ambidexterity and innovation performance; organizational ambidexterity affects innovation performance; and organizational ambidexterity mediates the relationship between digital transformational capability and innovation performance. The findings reveal that both digital transformational capability and organizational ambidexterity significantly enhance innovation performance, with organizational ambidexterity partially mediating this relationship. These insights are crucial for industry leaders aiming to foster digital transformation and leverage ambidexterity to boost innovation capabilities. The study contributes to the field by empirically exploring the interplay of these constructs in the context of the automotive components industry, offering strategic guidance for navigating the digital era.

Keywords: Organizational Ambidexterity, Digital Transformational Capability, Innovation Performance, Competitive Advantage, Automotive Components Industry



15.00 – 15.15 Parallel Session 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design

Room : Offline - Galunggung

Presenter : Yusuf Arindyatama Putra

Efficiency of Buoyancy Force Generation in a Pump-Based Buoyancy Engine for a Small-Scale Underwater Glider

Yusuf Arindyatama Putra¹, Arie Sukma Jaya¹

Universitas Pertamina¹

Abstract. Underwater gliders are recognized for traveling long distances with minimal energy consumption by adjusting buoyancy and attitude. Despite technological advancements, gaps remain in understanding their performance at smaller scales. This study develops a simple pump-based buoyancy engine for a scaled underwater glider model, utilizing a 150 ml syringe as part of the fluid pumping mechanism, driven by a servo motor and controlled by a microcontroller. The system is mounted in a tubular-shaped glider without control surfaces. The performance of the glider, including velocity and buoyant force efficiency, was evaluated at fractional volumes of 20%, 40%, 60%, and 80%. The results show a linear relationship between servo motor rotation and fractional volume, with sinking and floating velocity increasing by up to 25% and efficiency by up to 40%. This study emphasizes the potential of a pump-based buoyancy engine for small-scale glider development.

Keywords: Underwater glider, buoyancy engine, scaled model, energy efficiency, fractional volume

15.15 – 15.30 Parallel Season 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design
Room : Offline - Galunggung
Presenter : Dwi Listiawati

Planning of Power Capacity, Low Voltage Network and Electrical Installation in the Production of Refuse Derived Fuel Processing.

Dwi Listiawati¹, Pawenary¹, Hendri¹, Andi Dyah Harum¹

Institut Teknologi PLN¹

Abstract. Waste management is a critical issue in Indonesia that requires immediate attention to prevent negative impacts on the environment and public health. Magelang, one of the cities in Indonesia, has implemented a waste processing system that converts waste into Refuse Derived Fuel (RDF). This research is qualitative and quantitative research using primary and secondary data obtained from TPS 3R KSPN Borobudur, Sekar Tanjung, Tanjung Sari Village, Borobudur District, Magelang Regency, Central Java, including statistical data, literature and reports related to waste management and population. The research findings indicate that the author designed and planned the electricity system, starting from the distribution network to the distribution transformer. The machines used were 3-phase electric machines and transformers with a capacity of 100kVA. The power was increased from 33.00kVA to 66,000kVA, using 28 distribution poles, each with about 50 meters. The author can obtain information on power capacity, low voltage, and electrical installations for building waste processing. Additionally, they should research the process of processing 10 tons of waste per day and calculate the monthly profit of IDR 17,590,550. It is important to note that the investment will be recouped within 5 years and 7 months.

Keywords: Guidance, Waste Management, Refuse Derived Fuel, West to Energy

15.30 – 15.45 Parallel Session 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design
Room : Offline - Galunggung
Presenter : Luq Luq Fathyah Salim

Design of an Ergonomic Cooking Table Based on REBA and RULA Analysis to Reduce the Risk of Musculoskeletal Injuries for Operators at PT XYZ

Khusnun Widiyat¹, Luq Luq Fathyah Salim¹

Pertamina University

Abstract. PT XYZ is a company operating in the FnB sector with its main activity being cooking, but currently lacks a cooking table that is safe from musculoskeletal injury. The design of an ergonomic cooking table is proposed to reduce the risk of musculoskeletal injuries for PT XYZ's cooking operators. The methods used in this design include risk measurement methods such as Rapid Entire Body Assessment (REBA) and Rapid Upper Limb Assessment (RULA). From the risk assessment before the design, the average REBA risk score was 7, classified as medium risk, and the average RULA risk score was 7, classified as high risk, requiring immediate improvement to reduce potential injury risks. The design was carried out by considering the upper arm and lower arm angle magnitude for the 5th percentile body dimensions of workers. The design considerations for the cooking table included ergonomic factors, functionality, materials and construction, and compliance with standards and regulations. Based on these considerations, the table dimensions were determined to be 180 x 70 x 50 cm, with the main material being Stainless Steel 304. The table was then tested using a prototype, and the average REBA risk score was 2.6 and the average RULA risk score was 3.8. Statistically, the designed table successfully reduces the average risk of musculoskeletal injuries.

Keywords: FnB, musculoskeletal injury, ergonomic, cooking table, product design.



15.45 – 16.00 Parallel Session 2

Sub-Theme : Engineering Innovations From Power Systems to Human-Centric Design
Room : Offline - Galunggung
Presenter : Mochamad Yunus

Design and Implementation of Electrical Usage Monitoring Device Base on Internet of Things in Industry

Evyta Wismiana¹, Yogi Saputra², Mochamad Yunus^{3}, Yamato⁴, Achmad Munir⁵, Wahyu Mulyo Utomo⁶*

Pakuan University^{1,2,3,4}; Institut Teknologi Bandung⁵; UTHM, Johor, Malaysia⁶

Abstract. Design and Implementation of Electrical Usage Monitoring Device Base on Internet of Things in Industry has been presented. The electrical energy consumptions such as the amount of current, voltage, power, frequency, included the quality of electricity supply are measured by the Digital Power Meter (DPM). It is integrated with Automatic Meter Reading (AMR) in industry. The DPM is controlled by ESP32 that connected to server through a network. The component systems consist of power meter, current transformer (CT), RS 485, ESP32, step down, and power supply. The ARDUINO IDE software is used for programming. The measurement results are displayed on the power meter screen and monitored on the smartphone using the Blynk application software. By using the electrical usage monitoring device that base on internet of things, the electrical energy consumptions in industry can be observed real time anywhere and anytime.

Keywords: FnB, musculoskeletal injury, ergonomic, cooking table, product design.

13.15 – 13.30 Parallel Session 2

Sub-Theme : Material and Green Process Engineering

Room : Offline - Malabar

Presenter : Albie Yusuf Gautama

Simulation of Hydrogen Gas Production from Oil Palm Empty Fruit Bunch (OPEFB) Combined with Carbon Capture Based on Aspen Plus Software

Albie Yusuf Gautama¹, Rinaldi Medali Rachman¹

Universitas Pertamina¹

Abstract. Replacing fossil fuels and reducing carbon dioxide (CO₂) emissions are crucial steps in mitigating global warming. Hydrogen, as one of the renewable energy sources, holds the potential to address this challenge. Oil palm empty fruit bunch (OPEFB) biomass waste can be a feedstock for hydrogen gas production through biomass gasification. The conversion of biomass to hydrogen will also emit carbon dioxide which necessitates the use of carbon capture process. This research will develop a new simulation model using Aspen Plus which integrates gasification, water gas shift (WGS), and carbon capture processes. This simulation model is then used to investigate the effect of a gasification agent and its temperature on the production of syngas. It also explores the effect of additional steam into the WGS reactor on hydrogen production. Finally, the effect of the MDEA flow rate also studies on carbon dioxide adsorption capacity. The results demonstrated a mixture of O₂ gasification agent and steam at 800°C gave the best results, with the hydrogen produced being 117 kg/hr per 1 ton/hr of OPEFB. The resulting Hydrogen Production Efficiency (HPE) value also shows a similar trend which reached 40% as the highest value. In the WGS reactor, the ratio of 0.6 steam to biomass gives the best results, at this ratio the hydrogen has reached a maximum point of 90 kmol/hr (191.5 kg/hr). In the carbon capture process, the mole ratio of 2:1 MDEA/CO₂ gives the best results with CO₂ captured reaching 99%.

Keywords: Gasification, Oil Palm Empty Fruit Bunch, Water Gas Shift, Carbon Capture, Hydrogen, Biomass

13.30 – 13.45 Parallel Session 2

Sub-Theme : Material and Green Process Engineering

Room : Offline - Malabar

Presenter : Sri Hastuty

Electrochemical Enhancement of Pitting Corrosion Resistance of Stainless Steel 201 using Citric Acid

Sri Hastuty^{1}, Muhammad Nur¹, Fayza Yulia¹, Nonni Soraya Sambudi¹, Fatwa Khoirrun Nadhor¹*

Universitas Pertamina¹

Abstract. Stainless steel is widely used in various industries due to its strong corrosion resistance. Stainless Steel 201 (SS201), known for its lower nickel content compared to grade 304, is favored for its affordability and good mechanical strength. However, SS201 is more susceptible to pitting corrosion in harsh environments than SS304. This study aims to improve SS201's pitting corrosion resistance through surface treatment using citric and nitric acids. Cyclic voltammetry with varying concentrations of citric acid of 1, 1.5, 2 M was employed. The Citric Acid was employed because of its Environmental Friendliness and Efficiency. Results show that higher citric acid concentrations improved corrosion resistance, with 2 M citric acid producing a pitting depth of 19.88 μm . The citric acid produced improved pitting corrosion resistance, because citric acid produces a more Cr-rich surface. Hence, the surface treatment using citric acid is more favorable to enhance the pitting corrosion resistance of SS201.

Keywords: Pitting Corrosion, Stainless Steel 201, Citric Acid, Surface Treatment.



13.45 – 14.00 Parallel Season 2

Sub-Theme : Material and Green Process Engineering

Room : Offline - Malabar

Presenter : Purwo Kadarno

Strength Analysis and Remaining Life Estimation of Storage Tank based on API 650 & 653

Ahmad Farras Zhillan¹, Purwo Kadarno¹, Muhammad Fatahillah Kawakibi Shodiqi²

Universitas Pertamina¹, PT. Pertamina RU III²

Abstract. Strength and remaining life of a storage tank was evaluated based on API 650/653 standard code. The tank was a vertical-cylindrical tank with a diameter of 29 meter and maximum capacity of 4,719 m³. The actual thickness of the shells of the tank were measured using ultrasonic testing. A finite element code ANSYS Workbench 2023 was used to perform the static stress analysis of the 3D model of the tank. The results show that the maximum equivalent stress was below the allowable stress of the material, hence the tank was considered safe based on API 650. The remaining life of the tank was then evaluated based on API 653. The critical section was found in the roof plate of the tank shell with a remaining life of 22 years.

Keywords: storage tank, strength analysis, remaining life estimation, API 650, finite element method



14.00 – 14.15 Parallel Session 2

Sub-Theme : Material and Green Process Engineering

Room : Offline - Malabar

Presenter : Abdullah Agus Salim Chamid

Outage Management to enhance plant performance and improve reliability of Coal-Fired Power Plants

Abdullah Agus Salim Chamid¹, I Nyoman Pujawan¹, Erwin Widodo¹

Institut Teknologi Sepuluh Nopember¹

Abstract. The goal of outage management is to ensure plant reliability and availability. The success criteria for an outage are the timeliness of completion and costs that do not exceed the budget. This study uses the interpretative structural modelling (ISM) method to determine elements affecting outage management. The ISM methodology analyzes complex systems by elucidating the relationships between different elements and transforming unclear or vague models into structured representations. This paper explores success factors that affect outage management and examines the connection vulnerability between them. Expert opinions and a literature study have led to the identification of 20 factors that influence outage success criteria. The proposed model facilitates an understanding of the interdependencies within outage management. As a result, coal-fired power plants can reduce downtime and associated expenses, optimize maintenance strategies, and improve reliability

Keywords: Outage, coal-fired power plant, Interpretive Structural Modeling (ISM), reliability, performance.



14.15 – 14.30 Parallel Session 2

Sub-Theme : Material and Green Process Engineering

Room : Offline - Malabar

Presenter : Eduardus Budi Nursanto

Extraction of Gelatin from Mackerel Bone (*Restrellinger brachysoma*)

Eduardus Budi Nursanto¹, Shavira El Madina¹, Ayu Dahlianti¹

Universitas Pertamina

Abstract. Mackerel bone is one of the wastes from fishery products that are not utilized yet. Fish bone is a source of collagen which is insoluble in water, but collagen can be hydrolyzed into gelatin. This study aimed to produce gelatin yield from mackerel bones using a citric acid solution in the demineralization process. This research was divided into four stages: the raw material preparation process, demineralization process, hydrolysis process, and drying process. The variations of citric acid used in the demineralization process were 9% and 11%. In addition, the variation of demineralization time used in this study was 24 hours and 48 hours. Parameters observed included yield, acidity (pH), water content, and heavy metal content. The results of this study showed that the concentration of 11% citric acid with a demineralization time of 48 hours resulted in the highest yield of 2.1%. Variations in the concentration of 11% citric acid with a demineralization time of 48 hours also produced the lowest water content with 11.33% and the smallest heavy metal content of 19300 ppm.

Keywords: Mackerel bone, hydrolysis, demineralization, gelatin, extraction

14.45 – 15.00 Parallel Session 2

Sub-Theme : Material and Green Process Engineering
Room : Offline - Malabar
Presenter : Yose Fachmi Buys

Mechanical Properties of Biocomposites from Epoxy Resin Reinforced with Sisal Fiber and Teakwood Sawdust

Prayoga Dwi Akbar Pamuji¹, Yose Fachmi Buys¹, Sylvia Ayu Pradanawati¹

Universitas Pertamina¹

Abstract. Due to their biodegradability and renewability, the utilization of lignocellulosic resources in composite materials has been receiving enormous attention. In this research, biocomposites from epoxy resin reinforced with various compositions of sisal fiber were produced, and their mechanical properties were analyzed. The effect of fiber alkaline treatment on the mechanical properties of the composites was also investigated. It was observed that as the content of the sisal fiber increases, the tensile strength as well as the Young's modulus of the composites also increases. It was also found that composites with alkaline-treated fibers exhibit higher values of tensile strength and Young's modulus compared with those of untreated fibers. Fourier Transform Infrared (FTIR) spectroscopy revealed the missing of the peaks correspond to hemicellulose and lignin elements of the sisal fiber due to alkaline treatment. The mechanical properties of the sisal fiber-reinforced epoxy composites can be further improved by the incorporation of the teakwood sawdust.

Keywords: Biocomposites; mechanical properties; epoxy; sisal fiber; teakwood sawdust



15.00 – 15.15 Parallel Session 2

Sub-Theme : Material and Green Process Engineering

Room : Offline - Malabar

Presenter : Yose Fachmi Buys

Mechanical Properties of Water Hyacinth Fiber and Teakwood Sawdust Reinforced Epoxy Biocomposites

Abdul Aziz¹, Yose Fachmi Buys¹, Arie Sukma Jaya¹

Universitas Pertamina¹

Abstract. This research attempts to produce composite materials from biomass resources such as water hyacinth fiber and teakwood sawdust. The effect of alkaline treatment of the fiber, as well as the effect of fiber content on the mechanical properties of water hyacinth-reinforced epoxy composites were investigated. It was found that the tensile strength of the composites increases, as the fiber content increases. It was also observed that the composites with alkaline-treated fiber show improved mechanical properties compared to those with non-treated fiber. Finally, the addition of the teakwood sawdust to the water hyacinth-reinforced epoxy composites increases further the mechanical properties of the materials.

Keywords: Biocomposites; mechanical properties; epoxy; water hyacinth fiber; teakwood sawdust.

15.15 – 15.30 Parallel Session 2

Sub-Theme : Material and Green Process Engineering

Room : Offline - Malabar

Presenter : IMA Putrawan

Optimizing Co-firing Ratio of RDF MSW and Coal in a Fluidized Bed Reactor

IMA Putrawan¹, INS Winaya^{2}, IN Simpen³, IBA Swamardika⁴, IM Rajendra⁵, WG Ariastina⁶, IPAY Pratama⁷*

Udayana University^{1,2,3,4,6,7}, Bali State Polytechnic^{1,5}

Abstract. Co-firing Refuse Derived Fuel (RDF) from Municipal Solid Waste (MSW) with coal presents a promising approach to urban waste management and reduction of fossil fuel dependency. This study primarily investigates the optimal co-firing ratio of RDF MSW and coal, alongside other operational parameters, in a laboratory-scale fluidized bed reactor. Experiments were conducted with variations in RDF MSW to coal ratio (5%, 10%, 15%), operating temperature (750°C, 850°C, 950°C), and excess air (15%, 20%, 25%, 30%) in a reactor with a combustion chamber volume of 1000 cm³. Results demonstrate that the co-firing ratio significantly influences combustion efficiency and overall performance. The optimal ratio was found to be 10% RDF MSW with 90% coal, yielding a peak combustion efficiency of 95.89% and a minimum Specific Fuel Consumption (SFC) of 0.19260 kg/kWh. This optimal ratio balances the benefits of RDF's higher volatile content with coal's stable combustion characteristics. Additionally, an operating temperature of 750°C and excess air of 20% complemented this optimal ratio, further enhancing stability and efficiency. SEM analysis and chemical composition studies of agglomerates revealed the role of Ca, K, Na, and Mg in deposit formation, providing insights into the interaction between RDF and coal during co-firing. This research offers valuable guidance for optimizing co-firing ratios in industrial applications, supporting the development of more efficient and environmentally friendly waste-to-energy solutions.

Keywords: Co-firing ratio, RDF, MSW, coal, fluidized bed, combustion efficiency, waste-to-energy.

15.30 – 15.45 Parallel Session 2

Sub-Theme : Material and Green Process Engineering
Room : Offline - Malabar
Presenter : IMA Putrawan

Gasification of Municipal Solid Waste in Dual Reactor Fluidized Bed with CO₂ as Gasification Agent

Temaja¹, INS Winaya^{2*}, IKG Wirawan³, IM Sucipta⁴, IPAY Pratama⁵, IMA Putrawan⁶

Udayana University^{1,2,3,4,5,6}, Bali State Polytechnic^{1,6}

Abstract. Municipal solid waste is a significant environmental issue, but it can also be used as an energy source. This work study of dual reactor fluidized bed gasification technology that transforms solid materials in MSW into gaseous fuel. The gasification process aims to produce higher-quality gas by utilizing CO₂ as a gasification agent. Silica sand is combined as a bed material to conduct heat between the two reactors. The effect of the use of CO₂ agents on the quality of syngas was tested at an operating temperature ranging from 400°C to 700°C. The test results show that changes in syngas composition are strongly influenced by variations in gasification temperature. Increasing temperatures result in a higher syngas composition, with the compositions of CO and H₂ increasing as the gasification temperature rises from 400°C to 700°C. Transitioning from air to CO₂ as a gasifying agent increases the CO composition of the resulting gas to 24.8%. The H₂/CO ratio rises from 0.6 when air is used as the agent to 0.7 when CO₂ is used. In summary, the gas's heating value increases due to the gasification temperature and changes in agents from air to CO₂.

Keywords: MSW, gas agent ratio, gasification, syngas composition, heating value



PROUDLY PRESENT
6TH - 7TH NOVEMBER 2024



BOGOR, WEST JAVA, INDONESIA

13.30 – 13.45 Parallel Session 2

Sub-Theme : Sustainable Practices in Construction and Disaster Risk Management

Room : Online - Kamojang

Presenter : Amalia

The Effect of Using Ground Granulated Blast Furnace Slag (GGBF) As a Partial Subtitute for Portland Cement in Fiber Concrete

aaaaaa¹, bbbbbb²

aaaaaaaaa¹, bbbbbbbbbb²

Abstract.

Keywords:

13.45 – 14.00 Parallel Season 2

Sub-Theme : Sustainable Practices in Construction and Disaster Risk Management
Room : Online - Kamojang
Presenter : Muh Luqman Khakim

Crashworthiness Analysis of High-Speed Train Trailer Structure in Indonesia

Muh Luqman Khakim¹, Achmad Syaifudin¹

Institut Teknologi Sepuluh Nopember¹

Abstract. There are two safety systems installed on high-speed train, i.e. active safety system and passive safety system. While the passive safety system was already employed, there are still many cases of train collisions that cannot be avoided. The purpose of this research is to evaluate the first developed Indonesian high-speed train (HST) trailer design compliance with crashworthiness standard (SNI 8826 and EN 15227). This research uses quantitative method through a numerical crashworthiness analysis using ANSYS - LS DYNA software. The object of research is the first Indonesian high-speed train (HST) trailer developed by PT INKA. The analysis was carried out by the case of collision between a train and a rigid wall at the velocity of 36 km/h (equivalent to 10 m/s) regulated by BS EN 15227:2008. The structure was simplified in form of surfaces. The material used was Aluminum 6005A-T6 with Johnson–Cook material model to define high strain rate properties. The connection between the parts of structure was defined by share topology and bonded contact. With this simulation, the data i.e. deformation length, total energy absorption, and deceleration pulse was collected. The data was validated by evaluating the hourglass energy. Typically, the hourglass energy maintained under 10% of the total energy. From the simulation result, we obtain that the deformation in the survival space is 49 mm, the total kinetic energy absorbed by the structures is 2.6 MJ, and the maximum wheelset displacement is 81 mm. This value is acceptable by the standard. But the average deceleration pulse reaches 11.12 g. This value is much higher than the acceptable value which is 5g. This research has limitations in parameter. The crash velocity regulated by the used standard was 36 km/h while the actual crash velocity was above 100 km/h. The next limitation is the object. The evaluated object is under development progress which means its geometry may change again. With this research, the safety awareness of the first Indonesian HST Trailer was evaluated. The result can help for the further crashworthiness implementation research e.g. crash zone area and impact module application.

Keywords: Crashworthiness, Vehicle Safety, Occupant protection, High-speed train, crash energy.

14.15 – 14.30 Parallel Session 2

Sub-Theme : Sustainable Practices in Construction and Disaster Risk Management
Room : Online - Kamojang
Presenter : Aditya Yudha Pratama

The Application Of Base Isolation System As Earthquake Resisting Technology On Mulya Medika Hospital, Samarinda

Aditya Yudha Pratama¹, Indra Ariani¹

Universitas Mulawarman¹

Abstract. Indonesia lies within Pacific Ring of Fire, so the buildings are prone to seismic activity. Therefore, it is important to considered structure designs that can withstand earthquakes. And one of the technologies widely used is base isolation, which the principle is to decouple upper structure from lower structure, thus extend structure period. The type used for this study is High Damping Rubber Bearing (HDRB) following the provisions of SNI 1726:2019 Chapter 12. The aim for this study is to compare existing fixed-base structure with base-isolated structure on Mulya Medika Hospital in Samarinda. A pushover analysis will be performed to determine structural performance level using ETABS. The parameters include base shear, drift, eccentricity, and plastic hinges damage. Based on analysis results, it has been proved that HDRB reduces earthquake forces received by upper structure while compared to existing fixed-base structure. In addition, the structural performance level improved when HDRB is applied.

Keywords: Base Isolation, Earthquake Resistant Structure, High Damping Rubber Bearings, Pushover Analysis, Structural Performance Level

14.30 – 14.45 Parallel Session 2

Sub-Theme : Sustainable Practices in Construction and Disaster Risk Management
Room : Online - Kamojang
Presenter : Syarvina

Analysis of Flood Vulnerability in Medan City Using the Analytical Hierarchy Process (AHP) Based on Geographic Information Systems (GIS)

Syarvina¹, Robi Arianta Sembiring¹, Ronald Leonardo Siregar¹, Awang Surya Rahman¹

Universitas Sumatera Utara¹

Abstract. Medan, as one of the largest cities in Indonesia, frequently experiences flooding that significantly impacts the lives of its residents and infrastructure. This study aims to analyze flood vulnerability in Medan using the Analytical Hierarchy Process (AHP) method integrated with Geographic Information Systems (GIS). The AHP method is employed to determine the weights of various factors contributing to flood vulnerability in social, economic, physical, and environmental aspects. The analysis results indicate social and economic aspects have a significant influence on flood vulnerability, with social vulnerability weighted at 42.36% and economic vulnerability at 40.53%. Out of the 21 sub-districts in Medan, 18 (86%) have a high level of flood vulnerability, while 3 (14%) exhibit moderate vulnerability. These findings are expected to serve as a basis for local government in formulating more effective disaster mitigation policies and spatial planning, as well as raising community awareness about flood vulnerability in their areas.

Keywords: flood vulnerability, Analytical Hierarchy Process, Geographic Information Systems, Medan, disaster mitigation.

14.45 – 15.00 Parallel Session 2

Sub-Theme : Sustainable Practices in Construction and Disaster Risk Management
Room : Online - Kamojang
Presenter : Robi Arianta Sembiring

Analysis of Drought Hazards in the Lake Toba Area

Robi Arianta Sembiring¹, Syarvina¹, Ronald Leonardo Siregar¹, Aidil Pratama¹

Universitas Sumatera Utara¹

Abstract. Drought in the Lake Toba area is an increasingly urgent challenge due to climate change and changes in land use. This study aims to identify and map drought hazards using the Analytic Hierarchy Process (AHP) combined with Geographic Information Systems (GIS). The AHP method is used to establish the relative weights of various factors influencing drought hazards, including rainfall, land use, water sources, and slope steepness. The analysis results indicate that the area classified as having high hazard covers 29,394 hectares, while the area classified as having moderate hazard spans 178,013 hectares. The sub-districts of Lumbanjulu, Muara, Siborong-borong, and Silaen have significant hazard areas, each exceeding 2,000 hectares. These findings are expected to provide useful information for natural resource planning and management, as well as adaptation strategies for local communities to mitigate the impacts of drought.

Keywords: drought hazard, Analytical Hierarchy Process, Geographic Information Systems, Lake Toba, disaster mitigation.

15.00 – 15.15 Parallel Session 2

Sub-Theme : Sustainable Practices in Construction and Disaster Risk Management

Room : Online - Kamojang

Presenter : Aina Balqis Azrin

Evaluation of Airflow and Thermal Comfort of an Automated Rapid Transit (ART) Through Predicted Mean Vote (PMV) and Predicted Percentage Dissatisfied (PPD)

Aina Balqis Azrin¹, Wan Mazlina Wan Mohamed¹, Koay Mei Hyie¹

Universiti Teknologi MARA¹,

Abstract. Automated Rapid Transit (ART) is a medium-capacity transit system designed to transport urban passengers using advanced technology, offering higher passenger capacity at a much lower cost compared to conventional light rail systems. Moreover, ART operates on clean energy sources, including electricity or hydrogen. ART has highlighted the need to study the indoor airflow and thermal comfort within these vehicles. Good thermal comfort and airflow can make passengers comfortable, and improve satisfaction, in order to enhance the competitiveness of the transportation. This study focuses on analyzing the thermal comfort and airflow inside the middle carriage of an Automated Rapid Transit vehicle. A three-dimensional model of the carriage was constructed to assess passenger comfort under three different air velocities: 1.6 m/s, 2.9 m/s, and 3.2 m/s, corresponding to blower speed levels 2, 4, and 6. The analysis also considered two different inlet temperatures of 14.7°C and 8.7°C, based on field measurements, and was conducted under conditions representing a passenger load of 74 persons (AW2). Using the SolidWorks Flow HVAC Module, thermal comfort was evaluated using the Predicted Mean Vote (PMV) and Predicted Percentage Dissatisfied (PPD) methods. Additionally, the PMV and PPD indices were calculated for individual passengers using the CBE Thermal Comfort Tool. The results indicate that most selected passengers fell outside the acceptable PMV range of -0.5 to +0.5 as specified in ASHRAE Standard 55-2020. At an inlet temperature of 14.7°C, most passengers experienced thermal sensations ranging from warm to somewhat warm. Conversely, at an inlet temperature of 8.7°C, passengers reported sensations ranging from slightly warm to neutral, and in some cases, slightly cool to cold. The study concludes that ART passengers may experience varying levels of comfort depending on their seating or standing position within the carriage.

Keywords: Airflow; Thermal Comfort; Automated Rapid Transit; Predicted Mean Vote; Predicted Percentage Dissatisfied.

15.15 – 15.30 Parallel Session 2

Sub-Theme : Sustainable Practices in Construction and Disaster Risk Management
Room : Online - Kamojang
Presenter : Pradipta Nandi Wardhana

COMPARISON OF PEAK FLOOD DISCHARGE AT AUTOMATIC WATER LEVEL RECORDER (AWLR) SALAMSARI CATCHMENT

Trio Gati Putra Pamungkas¹, Pradipta Nandi Wardhana¹, Dinia Anggraheni¹

Universitas Islam Indonesia¹

Abstract. Design peak flood discharge is important for designing infrastructures relating to water resources. AWLR Salamsari is located at upstream of Blongkeng River catchment area. This investigation compared between recorded and calculated discharge at AWLR Salamsari. Analysis of peak design flood discharges exploited synthetic unit hydrograph namely GAMA I, Limantara, and ITB-2. SCS and index phi (ϕ) method were calculated for effective rainfall intensity. There were two flood events namely 8-9 February 2013 and 23-24 December 2014 for investigations. The R^2 value for 8-9 February 2013 event were 0.82 (GAMA I and SCS) and 0.83 (GAMA I and ϕ). Moreover, percent error in peak (PEP) were 1.67% (GAMA I and SCS) and 7.10% (Limantara and ϕ). The 23-24 December 2014 event generated R^2 value of 1.00 (GAMA I and SCS) and 0.94 (GAMA I and ϕ). Furthermore, the best PEP value were 10.03% (Limantara and SCS) and 4.74% (ITB-2 and SCS).

Keywords: Design peak flood, synthetic unit hydrograph, effective rainfall intensity, observed discharge, calculated discharge

13.30 – 13.45 Parallel Session 2

Sub-Theme : AI, Modeling, and Ergonomics in Practical Application
Room : Online - Halimun
Presenter : Yusraini Muharni

Human-Centered Design for AI Service Chatbots for Kampung Batik Cibuluh Website

Lovely Lady¹, Yusraini Muharni¹, Muhammad Fadil¹, Hartono¹

Universitas Sultan Agung Tirtayasa¹

Abstract. This study explores the application of Human-Centered Design (HCD) principles in developing AI service chatbots for the Kampung Batik Cibuluh website. The unique cultural and commercial context of Kampung Batik Cibuluh necessitates a chatbot that not only enhances user experience but also respects and promotes the local batik tradition. By employing HCD methodologies, we aim to ensure that the chatbot meets the needs and preferences of both local artisans and global customers. Through iterative design processes, including user research, prototyping, and usability testing, the chatbot is tailored to provide intuitive navigation, personalized assistance, and seamless transactions. The results demonstrate significant improvements in user engagement and satisfaction, reflecting the efficacy of integrating HCD in AI chatbot development. This study underscores the potential of HCD for developing AI solutions that are culturally relevant, user-friendly, and effective in promoting local heritage in a digital marketplace.

Keywords: Human-Centered Design, artificial Intelligent, Chatbot development, Batik Cibuluh, usability testing

13.45 – 14.00 Parallel Session 2

Sub-Theme : AI, Modeling, and Ergonomics in Practical Application
Room : Online - Halimun
Presenter : Wahyu Dwi Kurniawan

Study on Suspension System Analysis of Electric Vehicles for Disabilities Through a FEM Modelling Approach

Wahyu Dwi Kurniawan¹, Agung Prijo Budijono¹, Rachmad Syarifudin Hidayatullah¹, Ibrohim¹, Susi Tri Umaroh¹

Universitas Negeri Surabaya¹

Abstract. This study analyzes the suspension system of multifunctional electric vehicles aimed at enhancing accessibility for individuals with locomotor disabilities. Driven by the reliance on unsafe modified tricycle vehicles, there is an urgent need for innovative transportation solutions. Utilizing Finite Element Modelling (FEM), the research examines the suspension system under unladen and laden conditions, focusing on vertical load distribution and stress behavior. Key components, such as spring performance and stress concentrations, are evaluated to ensure structural integrity. The driver's posture was assessed using the Rapid Upper Limb Assessment (RULA) for ergonomic compliance. Results show the suspension system operates effectively within safety margins, with stress values of 161.28 MPa (unladen) and 192.03 MPa (laden). This research provides insights into developing sustainable and ergonomically sound electric vehicles for disabled individuals, significantly improving mobility and user safety.

Keywords: Electric Vehicle, Suspension System, Finite Element Modelling, Locomotor Disabilities.

14.00 – 14.15 Parallel Session 2

Sub-Theme : AI, Modeling, and Ergonomics in Practical Application

Room : Online - Halimun

Presenter : Said Muhammad Baisa

Optimizing Raw Chicken Delivery for a Fried Chicken Business Using K-Means Clustering and Heuristic Approaches to Solve the Vehicle Routing Problem

Said Muhammad Baisa¹, Hendro Prasetyo¹, Arif Imran¹, Ilham Maulana¹

Institut Teknologi Nasional¹

Abstract. This study addresses the challenge of delivering raw chicken to 102 branches of a fried chicken business in the Bandung area, where ensuring timely delivery is a critical objective. To achieve this, K-Means Clustering was employed to group delivery locations, while heuristic approaches were applied to optimize routes and solve the Vehicle Routing Problem (VRP). The methodology involved clustering the branches into seven distribution routes to enhance delivery time efficiency. The results revealed that the optimal solution consisted of these seven routes, achieving a total travel time of 119 minutes. This study demonstrates that by combining K-Means Clustering with heuristic approaches to address the VRP, businesses can significantly improve delivery time efficiency. Further implications for logistics optimization in the food industry are discussed.

Keywords: Vehicle Routing Problem (VRP), K-Means Clustering, Heuristics, Distribution Routes, Optimization

14.15 – 14.30 Parallel Session 2

Sub-Theme : AI, Modeling, and Ergonomics in Practical Application

Room : Online - Halimun

Presenter : Arif Imran

A Metaheuristic for the Heterogeneous Fixed Fleet Vehicle Routing Problem

Arif Imran¹, Said Muhammad Baisa¹, Hendro Prasetyo¹, Alif Ulfa Afifa¹

Institut Teknologi Nasional¹

Abstract. This paper examines the practical transportation problem known as the heterogeneous fixed fleet vehicle routing problem (HFFVRP). Here, a limited number of heterogeneous vehicles are housed at a depot to serve a number of customers. To address the HFFVRP, we propose a VNS algorithm. The initial solution is generated using the Sweep algorithm and 2-opt procedure. The proposed VNS algorithm applies several neighbourhoods and local search methods. It is also equipped with a ruin and build strategy to allow the search to explore new solution space at the end of the algorithm. The less utilised routes will be selected, and their customers will be deleted. These routes' customers are then inserted into the existing routes or placed into new routes. The proposed algorithm is tested using the benchmark data set from the literature and produces competitive results compared to the published ones.

Keywords: metaheuristic, routing, fixed fleet, VNS, ruin and build

14.45 – 15.00 Parallel Session 2

Sub-Theme : AI, Modeling, and Ergonomics in Practical Application

Room : Online - Halimun

Presenter : Andre Dwijanto Witjaksono

Technology Dissemination for Cooperative Economic Empowerment: A Case Study of 3P Machine Implementation in Sidoarjo

Andre Dwijanto Witjaksono¹, Agung Prijo Budijono¹, Susi Tri Umaroh¹, Wahyu Dwi Kurniawan¹, Suwito¹, Agus Sukoco¹, Muhammad Ikhsan Setiawan¹

Universitas Negeri Surabaya¹

Abstract. This paper addresses the challenges faced by small and medium enterprises (SMEs) producing tempe in Desa Sepande, Sidoarjo. The traditional production methods result in inefficiencies and potential contamination due to non-food-grade equipment. We propose the implementation of a 3P Machine (Soybean Crusher, Peeler, and Hull Separator) to enhance production efficiency and product quality. Our methods include the procurement and installation of the 3P Machine, technical training for its use, and support for meeting Indonesian National Standards (SNI) and digital marketing strategies. Expected outcomes include a 300% increase in production capacity, improved product quality compliant with SNI, and a 50% increase in market access. This integrated approach aims to strengthen the tempe industry and enhance competitiveness through innovation.

Keywords: SMEs producing tempe, 3P machine, bina SNI

15.00 – 15.15 Parallel Session 2

Sub-Theme : AI, Modeling, and Ergonomics in Practical Application
Room : Online - Halimun
Presenter : Muamar Zainul Arif

Human Posture Assessment and Safety Overview Related to Sansak Digital Based Simulation Modelling

Muamar Zainul Arif¹, Pradini Puspitaningayu¹, Awang Flrmansyah¹, Andre Dwijanto Witjaksono¹, Agung Budijono¹

Universitas Negeri Surabaya¹

Abstract. This study aims to optimize the ergonomic and safety aspects of Sansak Digital through human posture assessment and the Factor of Safety (FOS) value indicator to evaluate the product's safety range. The methodology involves assessing human posture by analyzing degrees of freedom (DOF) for various body parts, including the leg, arm, head, and hand, and calculating ergonomic scores for each. The FOS value is used to determine the product's ability to withstand applied forces, ensuring its safety. The results showed ergonomic scores of 3 for the leg, 2 for the arm, 3 for the head, and 2 for the hand, with lower scores indicating better ergonomic conditions. The FOS value of 5.6 demonstrates the product's strength under high-force applications. These results emphasize the need for careful ergonomic and safety assessments to improve the performance and safety of the Sansak Digital system.

Keywords: human posture assessment, ergonomic score, Factor of Safety, degrees of freedom, Sansak Digital.



15.15 – 15.30 Parallel Session 2

Sub-Theme : AI, Modeling, and Ergonomics in Practical Application

Room : Online - Halimun

Presenter : Risa Aisyah

Artificial Intelligence as a Productivity Tool for Human Resource Competency Development: A Systematic Literature Review

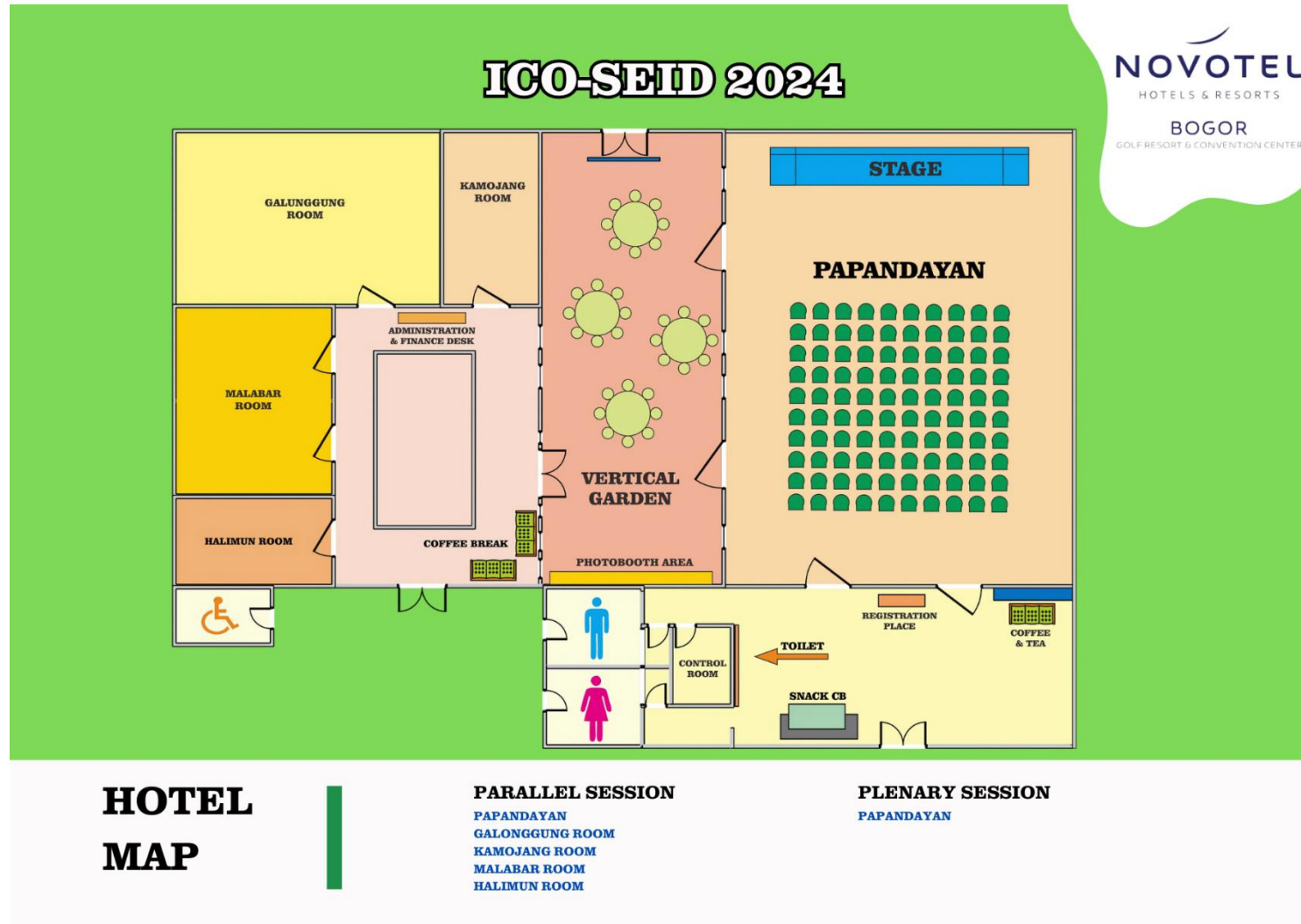
Risa Aisyah¹, Joko Siswanto²

Institut Teknoloji Bandung¹, Institut Teknologi Garut

Abstract. Introduction: The development of artificial intelligence (AI) technology presents new potential as a productivity tool that enhances efficiency and flexibility in human resource (HR) competencies across various industries. **Methods:** This research employs a systematic literature review following PRISMA guidelines, with data from academic databases analyzed through VOS viewer to identify the types of AI tools used in the development of human resource competencies. **Results:** This research demonstrates the use of AI in a variety of ways to improve efficiency and flexibility in the development of human resource competencies, with variations based on the needs and capabilities of the organization. **Discussion:** AI as a productivity tool offers greater efficiency and flexibility than traditional methods, allowing for an adaptive and responsive approach to the sustainable development of human resource competencies.

Keywords: Artificial Intelligence; Human Resource Competency Development; Productivity Tools; Sustainable Development; Systematic Literature Review

Map of Conference Venue



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