UNIVERSITAS JAYABAYA
FAKULTAS TEKNOLOGI INDUSTRI
Teknik Elektro | Teknik Kimia | Teknik Mesin
TERAKREDITASI B

SURAT TUGAS
Nomor : 71.45.034/SRT TGS/KPK/S1/FTI-UJ/VII/2021

Yang bertanda tangan di bawah ini :

Nama : Dr. Yeti Widyawati, S.T, M.Si
NIDN : 0330087201
Jabatan : Ketua Program Studi Teknik Kimia FTI-UJ

Dengan ini memberikan tugas kepada nama dibawah ini :

No.	NIDN	NOPEG	NAMA DOSEN
1	0309107306	F.7091639	Ferra Naidir, S.T, M.Eng, Ph.D.
2	0012116502	E.5901157	Dr. Flora Elvistia F, M.Si.
3	0303058003	E.6091674	Rinette Visca, S.T, M.Si.

Sebagai pemakalah pada the 6th International Engineering Student Conference berjudul "***Recycling Solvent Organic Waste of Used Lube Oil by Fractional Distillation Process***" yang diselenggarakan pada tanggal 16 Juli 2021 di Depok.

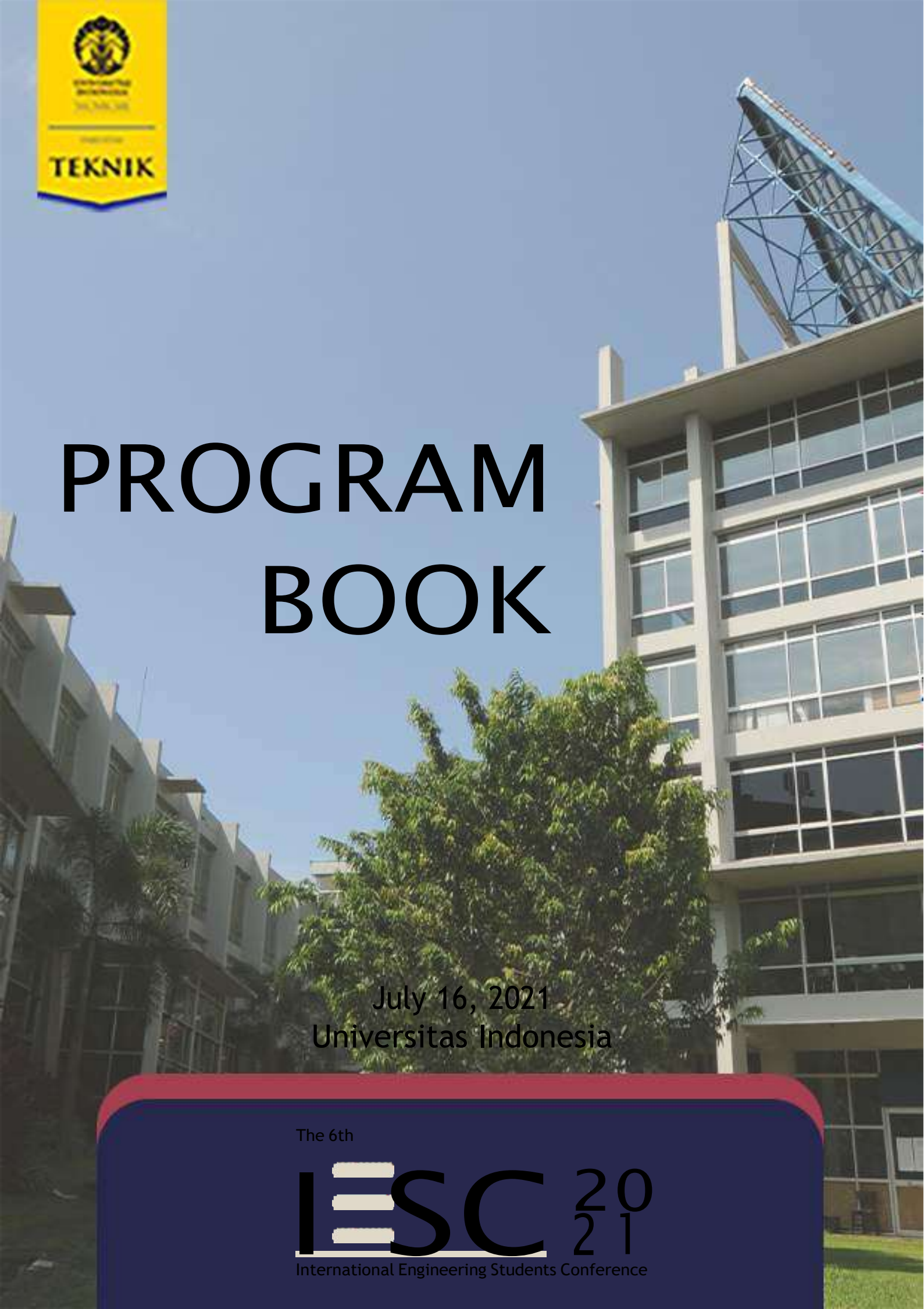
Demikian surat tugas ini diberikan untuk digunakan sebagaimana mestinya, dan agar dapat dilaksanakan dengan penuh tanggung jawab. Atas perhatian dan kerjasamanya disampaikan terimakasih.

Jakarta, 15 Juli 2021
Ketua Prodi Teknik Kimia S1

Dr. Yeti Widyawati, ST, M.Si

Tembusan kepada Yth :

1. Dekan FTI-UJ (untuk diketahui);
2. Para Wakil Dekan FTI-UJ;
3. Ka. UPM FTI-UJ;
4. Ka. UP2P FTI-UJ;
5. Yang bersangkutan
   - Arsip



PROGRAM BOOK

July 16, 2021
Universitas Indonesia

The 6th

IESC 2021

International Engineering Students Conference

Program Book

The 6th IESC 2021 International Engineering Student Conference

The 6th International Engineering Students Conference (IESC)2021

Organized by Faculty of Engineering Universitas Indonesi.a

Depok, 16 July 2021

Program Chair:
Badrul Munir, PhD

Organizing Committee:
BEM Fakultas Teknik UI

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CONTENTS

INTRODUCTION

The 6th International Engineering Students Conference (IESC) is a conference organized by Faculty of Engineering Universitas Indonesia. The conference will be held on 16 July 2021, in University of Indonesia Campus, Depok, West Java , Indonesia. The 6th International Engineering Students Conference (IESC) is an annual conference organized by Faculty of Engineering Universitas Indonesia, aims to provide a scientific and networking platform for young researcher and student in Engineering and Technology fields. The conference will be held at 16 July 2021, in Depok, Indonesia.

Original papers are invited and submitted papers should not be previously published or currently under review for any other publication, submission of a paper should beregarded as undertaking that, should the paper be accepted, at least one of authors will attend the conference to present the paper. Field of interest :

- Sustainable and Clean Energy
- Infrastructure and transport
- Biotechnology and Bioprocess Engineering
- Chemical Process andEngineering
- Sustainable Building, City, and Community
- Electrical, Computer, and Biomedical Engineering
- Metallurgy and Materials Engineering
- Mechanical, Manufactured and Marine Engineering
- Industrial Engineering

TIMELINE

Date	Event
June 30th, 2021	Abstract Submission Deadline
July 3rd, 2021	Accepted Abstract Announcement
July 3rd, 2021	First Day of Payment Period
July 5th, 2021	Paper Submission Deadline
July 12th, 2021	Last Day of Payment Period
July 15th, 2021	Presentation SubmissionDeadline
July 16th, 2021	Opening Ceremony
July 16th, 2021	Conference Day

GUIDELINES FOR THE OPENING CEREMONY

1. The opening ceremony will be held at July 16th, 2021 at 09.00 (GMT+7, Western Indonesian Time).
2. The opening ceremony will be held using Zoom as the platform of the ceremony at bit.ly/OpeningIESC2021
3. All participants should attend the opening ceremony from beginning untill the end of the ceremony.
4. If you want to invite your friend to watch the opening ceremony as general participant, they must register atbit.ly/IESC2021Registration
5. Opening Ceremony Rundown :

16 July 2021 Opening Session 09.00 – 11.30

Opening From Master of Ceremony
Opening Speech From Program Committee Chairman Badrul Munir, PhD
Opening Speech FromVice Dean for academic affairsof FTUI Dr. Muhamad Asvial
Special Performance BKST FTUI
Keynote Session Moderator: Ghiska Ramahdita, M.T., M.Sc. 1. Dr. Desti Alkano Co-Founder Energy Academy Indonesia, Netherland *"Bold Moves to Boost Jobs & Economic Growth in Energy Sector"* 2. Dr. Alfian Noviyanto Director, Nano Center Indonesia, Indonesia *"Synthesis of Nano-sized Manganese Oxide and Its Derivative Compound from Local Manganese Ore"*
Closing

GUIDELINES FOR THE CONFERENCE DAY

TIME AND DATE

1. The conference day will be held at July 16th, 2021.
2. The conference day will be held from 13.00 until 17.10 (GMT+7, Western Indonesian Time).
3. The conference day schedule can be seen at the next chapter of this guidelines.

PLATFORM

1. The conference will be separated for each field of interest.
2. The conference will be held using Google Meets platform.
3. The conference room link can be seen at the next chapter of this guidelnies.

PRESENTATION

1. Each paper should be presented by one of the group member or all group members.
2. The duration of the presentation is 15 minutes plus 5 minutes QnA session.
3. The presentation is on live streaming session.
4. The presenter must USE ENGLISH as the main language of the presentation.
5. General Participant (Non-Presenter) are welcome and they can freely register at bit.ly/IESC2021Registration (limited seat for each room)
6. The QnA session can be given by the moderator and audience.
7. Question can be given through the chat space that given by Google Meets platform.
8. The presentation will be presented by the author using the screen sharing button in Google Meets platform.
9. Presenter should use our virtual background which could be downloaded at: bit.ly/IESC2021VirtualBackground

PRESENTATION SLIDE

1. Each author/presenter must submit a presentation slide.
2. Each presentation consists around of 10 slides, excluding the opening and closing slide.
3. The slide must be submitted by 15 July 2021, at 22.00 (GMT+7, Western Indonesian Time).

4. The presentation should be submitted through this lin:k
   bit.ly/IESC2021Presentation

CONFERENCE ROOM

1. Room 1:Chemical Engineering
   bit.ly/Room1-IESC2021

2. Room 2: Infrastructure (Civil & Architecture)
   bit.ly/Room2-IESC2021

3. Room 3: Electrical and Electronics
   bit.ly/Room3-IESC2021

4. Room 4: Energy
   bit.ly/Room4-IESC2021

5. Room 5: Industry
   bit.ly/Room5-IESC2021

6. Room 6: IT and Data Analytics
   bit.ly/Room6-IESC2021

7. Room 7: Metallurgy Materials1
   bit.ly/Room7-IESC2021

8. Room 8: Metallurgy Materials2
   bit.ly/Room8-IESC2021

GENERAL PARTICIPANTS (NON-PRESENTER) ATTENDEES

1. Attendees should register to get a free E-Certificate at :
   bit.ly/IESC2021Registration
2. Attendees are prohibited to intervere the conference using the camera or microphone.
3. Attendees can raise questions through the chat section in theGoogle Meets platform.

SCHEDULE : CHEMICAL ENGINEERING

16th July, 2021			
Room 1: bit.ly/Room1HESC2021 Moderator: Dr. Riezqa Andika			
No.	Time	Paper Number	Title (Author)
1	13.00	6	Effect of Pressure and Temperature on Hydrodeoxygenation of Triolein Using Trickle Bed Reactor for Green Diesel Production (Yuswan Muharam and Salahaldeen Aljafreh)
2	13.20	24	A Review of Recent Advances In Liquid Desiccant Dehumidification And Air-Conditioning (Oldy Fahlovi, Nandy Putra and Dinni Agustina)
3	13.40	31	Technical and Invesment of Wax Plugging Countermeasures on a 20 Inch Underwater Crude Oil Transportation Pipe for 30 KM (Muhammad Rizky, Asep Handaya S and Ruspenda Ruspenda)
4	14.00	36	Analysis and Simulation of Flare Gas Recovery in Oil Refinery Plant for Improving Plant Energy & Economic Efficiency (Ilham Dwiyanto Emzar and Sukirno)
5	14.20	40	Hydrodeoxygenation of Bio Oil Produced by Co-Pyrolysis of Polypropylene-Crude Palm Oil using Self Gas-Inducing Impeller Reactor (Ja'Far Abuabdillah Ashshiddiq and Dijan Supramono)
6	14.40	45	Effect of Printed Circuit Board Electronic Pyrolysis Temperature on Carbon Particle Mass (Gilang A. Yudhistira, Myrna A. Mochtar and Wahyuaji N. Putra)
7	15.00	55	Synthesis Polyisobutylene (PIB)-Based Fuel Additive and Evaluation of Its Physical and Chemical Properties (Siska Pebriani, Sukirno Sukirno, Dwi Febriantini and Aji Satria Nugraha)
	15.20	BREAK	
8	15.30	99	Recycling Solvent Organic Waste of Used Lube Oil by Fractional Distillation Process (Rinette Visca, Flora Elvistia, Ferra Naidir, Ade Julien, Hera Dwi Paramitha, and Ika Uswatun Hasanah)
9	15.50	103	Analysis of The Effect of Rice Husk and Teak Wood Powder Mixed Bricket Composition and The Addition of Lapindo Mud on Physical Parameters and Combustion Rate (Rosmawati Siregar, Sigit Tri Wicaksono and Mas Irfan P Hidayat)
10	16.10	7	Analysis of Biodiesel B30 Fuel Quality used for Automotive Sector

16th July, 2021			
Room 1: bit.ly/Room1-IESC2021 Moderator: Dr. Riezqa Andika			
No.	Time	Paper Number	Title (Author)
			(Rudy Dwi Wahyusyah and Rinaldy Dalim)i
11	16.30	110	Control of Blood Glucose Levelfor Different Type 1 Diabetes Mellitus Subjects: In-Silico Works Using Improved Hovorka Equations (Muhammad Faris Johari, Ayub Md Som, Sherif Abdulbari Ali, Nur'amanina Mohd Sohadi and Noor Shafina Mohd Nor)
12	16.50	104	Risk Assessment Of Geothermal Drilling Make-Up Well-X Project (Wahyu Hidayat and Asep Handaya Saputra)
	17.10	CLOSING	

SCHEDULE :INFRASTRUCTURE(CIVIL & ARCHITECHTURE)

16th July, 2021			
Room 2: bit.ly/Room2-IESC2021 Moderator: Aulia Qisthi, MSc			
No.	Time	Paper Number	Title (Author)
1	13.00	26	Development of Risk Management Analysis to Prevent Delay in Construction Project of OffshoreFacility Compression Sub System (Nunu Nuramanu, Badrul Munir and Ayomi D Rarasat)i
2	13.20	27	Development of Safety Plan for Tunnel Project Based on Work Breakdown Structure (WBS) to Improve Safety Performance (Jumadi and Yusuf Latief)
3	13.40	69	Evaluation of Land Acquisition as a Strategy for Accelerating Road Infrastructure Development in DKI Jakarta (Ebend Ferry Nobel and Ayomi Dita Rarasat)i
4	14.00	85	Development of Notification Tool of Occurrence of Work Obstacles to the Implementation of Tanjung Priok Access Road Construction Project Based on Work Breakdown Structure and FIDIC Conditions of Contracts (Ilman Kurniadi, Ayomi Dita Rarasati and Afrizal Nursi)n
5	14.20	94	Land Sliding Risk Category along Pipeline Gas Road Based on Risk Matrix Model (Bela Arrosyid)
6	14.40	106	The Effect of ISO 9001:2015 Implementation on Project Performance and Business Continuity at Construction Companies in Jakarta (Adimas Candra Anugrah and Leni Sagita Riantin)i
7	15.00	92	Risk Evaluation Causesof Contract Change Orderto Improve Cost Performanceon Railway Development Project (Lukman Noerochim and Rachmad Prabowo)
	15.20	BREAK	
8	15.30	109	Motorcycle Traffic Accident Model Basedon Riding Behavior (Case Study of Kupang City, East Nusa Tenggara) (Leila Adriana and Hera Widyastuti)
9	15.50	113	Analysis of Suroboyo Bus Operational Performance Based on Passenger Perception (Widia Rhamdani and Hera Widyastuti)
10	16.10	3	Biophilic Design: Virtual Nature Application in a Windowless Room

16th July, 2021			
Room 2: bit.ly/Room2-IESC2021 Moderator: Aulia Qisthi, MSc			
No.	Time	Paper Number	Title (Author)
			(Wilda Maulina and Dalhar Susanto)
11	16.30	80	Earthquake-Resistant Building Constructionin The Traditional Architectureof Nias Islands (Fajar Rian Wulandari and Dalhar Susanto)
12	16.50	38	Analysis of Delay Factors in The Stage of Development of State Buildings in The Department of Human Settlements, Spatial Planning, and Land Affairs of DKI Jakarta Province (Yudhy Trielistyanto and Ayomi Dita Rarasat)i
	17.10	CLOSING	

SCHEDULE : ELECTRICAL AND ELECTRONICS

16th July, 2021			
Room 3: bit.ly/Room3-IESC2021 Moderator: Dr. Tomy Abuzairi			
No.	Time	Paper Number	Title (Author)
1	13.00	9	Comparative Analysis of Electronic Waste Treatment in Indonesia with ITU-T Standard L.1031 (Anita Rizkiyani and Catur Apriono)
2	13.20	19	Recommendations Development for Country Frameworks onE-Waste Management Referring to ITU-T Standard L.1030 (Ibrahim Tarigan and Catur Apriono)
3	13.40	21	Canalization of HouseholdElectronic Waste in Indonesia (Savitri Amalia and Catur Apriono)
4	14.00	30	Integrated Strategy Framework To Improve Quality Of Network on The BMKG Communication Network System (Budi Dwinanto, Ajib Setyo Arifin and Budi Dwinanto)
5	14.20	50	Optimation Electrodeposition with Adaptive Deep Neural Network for Rectifier in Painting Process (Iqbal Riza Fathuddin and Iwa Garniwa)
6	14.40	53	The Effect Power Variations of Induction Cookers on Harmonics (Ridho Yuwono and Budi Sudiarto)
7	15.00	75	Optimization of The Ereke Electricity Generation System Development (Aghnia Nur An Nisa and Iwa Garniwa)
	15.20	BREAK	
8	15.30	88	HemoglobinNon-Invasive Measurement on Multi Wavelength Pulse Oximetry Method with Linear Regression and XGBoostAlgorithm (Amri Khurniawan, Sri Dewi Sartika Syarifuddin and Sussi Sussi)
9	15.50	97	Technical and Financial Analysis of Cofiring the Existing Coal FiredSteam Power Plant 635 MW Gross Output with Sawdust (Widya Faisal Wahyudi and Iwa Garniwa Mulyana)
10	16.10	70	Cluster Analysis of the Indonesian Mobile Subscribers in 3 Provinces : The Case of 4G Wireless Technical Performance

16th July, 2021			
Room 3: bit.ly/Room3-IESC2021 Moderator: Dr. Tomy Abuzairi			
No.	Time	Paper Number	Title (Author)
			(Naufal Ikhwanuddin and Muhammad Suryanegara)
11	16.30	119	Comparative Study Of Global Navigation Satellite System and Automatic Number Plate Recognition for Electronic Toll Collection (Bobby Zainir)
	16.30	CLOSING	

SCHEDULE : ENERGY

16th July, 2021			
Room 4: bit.ly/Room4-IESC2021 Moderator : Dr. M Arif Budiyanto			
No.	Time	Paper Number	Title (Author)
1	13.00	25	Analysis of Design Capacity Calculations And Cost Savings From Installing Flare Gas Recovery System (FGRS) At Refinery In Indonesia (Irwan Kristiawan and Adi Surjosatyo)
2	13.20	29	Analysis Substitutionof BBM Motorcycle to Electric Motorcycles for Eliminate Import Fuel (Raden Muhamad Rizza Fahlevi andRinaldy Dalimi)
3	13.40	33	Comparative Analysis of Machine Learning Techniques to Predict Risk Based Inspection Assessment for Gas Transmission Infrastructure (M Nuramzan Iftariand Andy Noorsaman Sommeng)
4	14.00	47	Comparative Analysis of The Economic Value and Emission on Electrical Car Charging Between PLN electricity and Solar Cell (David Al Rosyid)
5	14.20	71	Improving the Community's EconomyDuring the Covid19 Pandemic Through Energy Saving Culture (Cakrawati Sudjoko andDliyaulhaq Ghany)
6	14.40	81	Coal and Dimethyl Ether Price Modeling Analysis as Coal-Downstreaming Activity Supports (Hary Wahyudi Putra and Dedi Priadi)
7	15.00	87	Reflector Design to Optimize Bifacial Solar PV Modul Output (Selly Danastri, Badrul Munir,and Eko Adhi Setiawan)
	15.20	BREAK	
8	15.30	95	The Future Prospect of the Application of Local Fruit Waste Derived Dye-Sensitized Solar Cells in Indonesia (Gusaimas Matahachiro HanggoroHimawan Akbar and Muhammad Caessar)
9	15.50	118	Analysis of Power Generation Sector Road Mapto Achieve Net-Zero Emission (Sadmoko H Pambudi and Rinaldy Dalimi)
10	16.10	107	Determining the Thermal Conductivity of Natural Fibers with Axial Flow Method (Nandy Putra, Evi Sofia and Bambang Gunawan)

16th July, 2021			
Room 4: bit.ly/Room4-IESC2021 Moderator : Dr. M Arif Budiyanto			
No.	Time	Paper Number	Title (Author)
11	16.30	72	Techno-Economic Analysis of Power Plant Installation on Offshore Wellhead Platform By Optimizing Renewable Energy Potential (Chandra Rungngu Sirenden andRudy Setiabudy)
	16.50	CLOSING	

SCHEDULE : INDUSTRY

16th July, 2021			
Room 5: bit.ly/Room5-IESC2021 Moderator : Ekky Tamarar, MSc			
No.	Time	Paper Number	Title (Author)
1	13.00	48	Evaluation of the Business Continuity Management using ISO 22301:2019 (Casestudy on the XYZ Organization) (Sigit Hardhiyono and Kalamullah Raml)i
2	13.20	73	TVRI Broadcasting Business Model Analysis Towards the Digital Television Era (Agie V. Putri and Gunawan Wibisono)
3	13.40	86	Improving oil and gaswireline log data qualityusing six sigma methods (Desma Rosjid, Leni Sagita and Mohammad Ichsan)
4	14.00	98	Improving Queueing System for COVID-19 Vaccination in Indonesia with YoVid Mobile Application Prototype (Chatarina Petra, Aura DiandraShabrina and Kinanthy Dwi Pangesty)
5	14.20	116	Evaluation to Reduce Potential Dead Stock of Production Component on Inventory of Automotive Industry Plant (Abdi Mustaqim)
6	14.40	122	Model Conceptualization on Understanding the Music Business Model ofIndependent Artist in Indonesian Music Industry (Ezra Mandira, Akhmad Hidayatno and Komarudin Komarudin)
7	15.00	14	Identification of Sensor Performance Quality Standards as Recommended Standards for IoT Technology in Food Supply Chain inAustralia (Muhammad Fahreza Kresnamurti and Catur Apriono)
	15.20	BREAK	
8	15.30	17	Study of IoT in Food Products Supply Chain Based on ISO/EIC 22417, Case Study of Fish-Based Products in Surabaya (May Hendra Panjaitan and Catur Apriono)
9	15.50	11	Analysis of the Influence of the Implementation of the IEEE 7010 Standard on the Shopee and Tokopedia Platforms (Kancerio Chalvari and Catur Apriono)
10	16.10	12	Analyze Factors That Impact Growth of E-Commerce Users with DeLone & McLean Model (Ahmad Yusran Siregar and Catur Apriono)

16th July, 2021			
Room 5: bit.ly/Room5-IESC2021 Moderator : Ekky Tamarar, MSc			
No.	Time	Paper Number	Title (Author)
11	16.30	8	Development Of Interrelated Model Between WBS, BIM, Information System, Web, And OHSEMS for Safety Performance of Construction In Universitas Indonesia Area (Nava Neilulfar Alvi, Leni Sagita, YusufLatief and Ayu Herzanita)
	16.50	CLOSING	

SCHEDULE : ITAND DATA ANALYTICS

16th July, 2021			
Room 6: bit.ly/Room6-IESC2021 Moderator : Dr. Gerry Liston			
No.	Time	Paper Number	Title (Author)
1	13.00	13	IEEE Std 2813-2020 Implementation Analysis Case Study : Tokopedia & Shopee (Muhammad Hilman and Catur Apriono)
2	13.20	15	Analysis of MGWS/WiGig Regulations in Indonesia Based on ETSI, ITU-R, IEEE Standards (Nyimas Adella Gustina and Catur Apriono)
3	13.40	51	Evaluation of Depok Single WindowApplication to Support Smart City: Value based Adoption Model (VAM) Approach (Ezra Dillon and Gunawan Wibisono)
4	14.00	52	Unsupervised Machine Learning for TopicBased Clustering on Japanese Short Answer (Dyah Lalita Luhurkinanti and Anak Agung Putri Ratna)
5	14.20	10	Evaluation of Smart Mobility Implementation in Jakarta Based on ISO 37122 Standard (Manzila Izniardi Djomiy and Catur Apriono)
6	14.40	16	Multiple Gigabit Wireless Systems (MGWS) in frequencies around 60 GHz implementation of Telecommunications, Manufacturing and regulatory recommendations in Indonesia (Fitra Ilham and CaturApriono)
7	15.00	18	Recommendations of Smart Mobility Development in Jakarta Using ISO 37120Standards (Roki Fernando and Catur Apriono)
	15.20	BREAK	
8	15.30	20	Channel Bonding Comparison Analysis with Channel Aggregation on Multiple Gigabit Wireless Systems (MGWS) with IEEE 802.11 ay Standard (Annisa Safrida and Catur Apriono)
9	15.50	42	Cybersecurity Capability Maturity Model Enhancement to Deal with Cyberattack in COVID-19 Pandemic (Cyril Nugrahutama Kurnarman and Muhammad Suryanegara)
10	16.10	82	Anomaly Intrusion Detection System Based On Homogeneous Ensemble Learning withOversampling and Feature Selection (Diwandaru Rousstia and Mia Rizkinia)

16th July, 2021			
Room 6: bit.ly/Room6-IESC2021 Moderator : Dr. Gerry Liston			
No.	Time	Paper Number	Title (Author)
11	16.30	89	Telemedicine-Based Monitoring System for Vital Health Parameters of Human Body Based on IoT Platform (Sri Dewi Sartika Syafruddin, Amri Khurniawan and Rendy Munadi)
12	16.50	77	Viral and Bacterial Pneumonia Classification from X-ray Images Using Deep Convolutional Neural Networks (Ghiffary Rifqialdi, Renard Elyon and Amadhea Yudith)
	17.10	CLOSING	

SCHEDULE:METALLURGYMATERIALS1

16th July, 2021			
Room 7: bit.ly/Room7-IESC2021 Moderator : Dr. Adam Febrianto			
No.	Time	Paper Number	Title (Author)
1	13.00	1	Evaluation of Mixing Purple Sweet Potato and Turmeric Extract as Green CorrosionInhibitor forAPI-5L Steel Pipe in 3.5% NaCl Environment (Giannisa Mashanafie, Aldi Putra Laksanaa, Djoko Nurprawito and Johny Wahyuadi Soedarsono)
2	13.20	2	Localized Loss Thickness at Weld Joint Elbow Pipe Caused Microbial Induced Corrosion (MIC) at Gas Processing Plant (H Fernando Sianipar, Arif Cahyono and Dr. Rini Riastuti)
3	13.40	32	Potential Utilization of Redmud as Waste Processing Bauxite Into Alumina In Indonesia (Albert Sconardo)
4	14.00	34	Evaluation control of corrosion on carbon steel pipe with chemical cleaning and passivation methods in a hot-rolled steel plant cooling water system (Harianto Anto and Ahmad Zakiyuddin)
5	14.20	37	Electrochemical behaviour of Al-5Zn-2Mg with copper and lanthanum as micro-alloying elements forlow-driving voltage sacrificial anode (Tsanaya Yuliany, Deni Ferdian and Ahmad Zakiyuddin)
6	14.40	57	Effect Of Lanthanum on Microstructure and Corrosion Behavior of Al-Zn-Sn as a Low Voltage Sacrificial Anode For Marine Environment (Dony Prasetya and Deni Ferdian)
7	15.00	58	The Effect of Lanthanum Addition on Corrosion Behavior and Microstructure of Low Voltage Sacrificial Anode Al-Zn-Cu Alloy (Antony Salim and Deni Ferdian)
	15.20	BREAK	
8	15.30	62	The Effect of Rare Earth Yttrium asAlloying Element to Corrosion Behavior of Al-Zn-Cu Sacrificial Anode (Hamid Sobirin and Deni Ferdian)
9	15.50	64	Risk Assessment on Riser at Offshore Facilities (Harisman Priladi, Johny W. Soedarsono, Djoko Nurprawito and Firmansyah Perdana)
10	16.10	67	Model Risk Analysis forCritical Buried Onshore Crude Oil Pipeline

16th July, 2021			
Room 7: bit.ly/Room7-IESC2021 Moderator : Dr. Adam Febrianto			
No.	Time	Paper Number	Title (Author)
			(Indra Mulyana, Ahmad Zakiyuddin and Johny Wahyuadi)
11	16.30	68	Effect of Yttrium Addition on Corrosion Behavior of A-l Zn-Sn Sacrificial Anodes (Rizky Rama Putra Manurung and Deni Ferdian)
12	16.50	60	Failure Analysis Coating Degradation on Corrosion Under Pipe Support (CUPS) by Using Visual and Metalography Examination (Arief Wisnu Kuncoro, Mariadi Mariadi, Rini Riastuti and Djoko Hadi Prajitno)
13	17.10	96	Synthesis and Characterization of LBMO Materials with Fe and Ti Doping as Wave Absorber Materials (Fauzul Ikhsan, Budhy Kurniawan and Witha B K Putri)
	17.30	CLOSING	

SCHEDULE:METALLURGY MATERIALS2

16th July, 2021			
Room 8: bit.ly/Room8-IESC2021 Moderator : Dr. M. Sahlan			
No.	Time	Paper Number	Title (Author)
1	13.00	4	Characteristic composite Al 7075 reinforced nano SiC with squeeze casting as an armour material produced by squeeze casting process (Yudhistira Adityawardhana and Anne Zulfia)
2	13.20	5	Effect of Repeated TIG Welding Cycles on Appearance of Intermetallic Phases of UNS 32760 Super Duplex SS (Alfian Alfian, Rini Riastuti and Winarto Winarto)
3	13.40	23	Morphological and mechanical properties of sepiolite/thermoplasticnanocomposites: A short review. (Abdulwasiu Muhammed Raji, Zurina Binti Mohamad and Azman)
4	14.00	44	Influence of filler metal TGX ER2209 and ER 2594 for Root Pass on Microstructure, Mechanical properties and Corrosion Resistance in Welding ofMaterial Duplex ASTM A928 UNS S31803 (Okky Wibowo, Winarto Winarto and Ahmad Zakiyuddin)
5	14.20	41	Failure Analysis of Tube Welding Joint in Pressure Safety Valve Instrumentation System (Gilang Cempaka Kusuma, Laili Novita Sari, Hadi Sunandrio and Winarto Winarto)
6	14.40	66	The Effect of surface roughness on Microstructure and mechanical properties in Copper rod, Aluminium rod, and Aluminium Alloy rod joined by Upset Butt welding (Hasan Fuadi, Winarto Winarto, Satria Rifqi Hilmi and Annisa Arivia)
7	15.00	79	Analysis Cylic Voltammetry Copper in Deep Eutectic Solvents for Recovery Copper from Printed Circuit Boards (PCBs) Waste Using Simultaneously Process Electroleaching– Electrodeposition (Heryatna Heryatna, Sri Harjanto and Reza Miftahul Ulum)
	15.20	BREAK	
8	15.30	93	Iodine Doping On Li4Ti5O12 Anode With Simple Milling Method To Increase Electrochemical Performance Lithium-Ion Battery (Lukman Noerochim andRachmad Prabowo)
9	15.50	108	Birackle (Bioleaching for Recycle Nickel) Nickel Bioleaching from Ni-Cd Battery Waste as A Solution for Utilizing B3 Waste as An Energy Source

16th July, 2021			
Room 8: bit.ly/Room8-IESC2021 Moderator : Dr. M. Sahlan			
No.	Time	Paper Number	Title (Author)
			(Anggi Supriyono and Evira B Yustiani)
10	16.10	102	Effect of AdditionAcetic Anhydride on Unsaturated Polyester /Vinyl Ester Blends on Mechanical Properties and Water Resistance for A36 Steel Coating Application (Bayu Aji, Hosta Ardhyananta and Sulistojono Sulistijono)
11	16.30	105	Absorption Coeffficient AnalysisFor Thermal Neutron From Ultra High Molecular Polymer Polyethylene Weight (UHMWPE) With H3BO3 (Fadilla Fadilla, Iwan Sumirat, Sigit Tri Wicaksono, Sulistioso Giat)
12	16.50	115	Analysis of The Mixture of Thin Layer Asphalt Concrete (Ac-Tl) Using Additional Natural Rubber Sir 20on Marshall Characteristics (Intan Safitri and Catur Arif Prastyanto)
13	17.10	117	Utilizing the Potential of Polymer Material within Wasted Tailings as a Way to Reinforce Structural Integrity of Polymer Concrete (Daffa Ammar Ramadhan, Nabila Putri, Gibran Muhammad)
	17.30	CLOSING	

Abstract List

The 6th

IESC 2021

International Engineering Student Conference

1

Chemical Engineering

Effect of 15 Bar Pressure and Temperature on Hydrodeoxygenation of Triolein Using Trickle Bed Reactor for Green Diesel Production

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Abstract. *A trickle bed reactor of 2.01 cm diameter and 35 cm length included 24 cm for the catalyst bed, used for the hydrodeoxygenation of vegetable oil for green diesel production was observed in this study. Vegetable oil was represented by triolein dissolved in dodecane with 5% v/v. The NiMo/Al_2O_3 catalyst with a composition of 6.18% w/w Ni, 12.48% w/w Mo, and 81.33% w/w Al_2O_3 was used. The reaction temperature range of 285-330 °C and pressure of 15 bar. With a controlled flow rate for both gas and liquid feed. The reactor successfully converts triolein into green diesel. At 15 bar, the dominant reacting component was C18 hydrocarbons with a concentration reach 50% w/w at high temperature. The best conversion, green diesel yield, purity, selectivity, and hydrodeoxygenation obtained were at the highest temperature named as follows, 99.96%; 76.43%; 78.76%; 346.38%; and 68.23% respectively for a temperature of 330 °C.*

Keywords: green diesel, NiMo/Al_2O_3 catalyst, trickle bed reactor, hydrodeoxygenatio

Analysis Quality Sample Test Result of Biodiesel Mixed Fuel (B30) Used in Automotive Sector

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Abstract. *Blending 30% biodiesel as a mixture of diesel fuel in 2020 is a GOI mandatory program according to the MEMR Regulation number 12 of 2015. However, in its implementation, the higher biodiesel content in the mixture, the more challenging it to maintain fuel quality in the storage and shipping process. Therefore, this study aims to ensure B30 fuel complies with the specification before the consumer uses it. This study was conducted by testing and comparing it with the specifications 411 samples of biodiesel from producers that entered the fuel terminal before the mixing process, 983 of B30 samples sent to gas stations. From sample testing results, the B30 tested complied with the standards and quality determined, with 88% of the samples meeting the 30% FAME content. Therefore, biodiesel diesel fuel mixed B30 marketed domestically has complied with the specifications.*

Keywords: Biodiesel (B100), Biodiesel-Diesel Fuel Mix (B30), Fuel Quality

A Review of Recent Advances In Liquid Desiccant Dehumidification And Air-Conditioning

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Abstract. *The use of refrigeration systems in building utility systems has been widely used since the twentieth century. However, the data shows that there are many problems that arise and are dangerous to the environment, such as global warming and high energy consumption rates. Several studies using liquid desiccants have shown significant results in overcoming this problem. Through independent temperature and humidity control, the desiccant air conditioning (DAC) system has multiple functions advantages (for example, efficient moisture control, no ozone-depleting coolant and easy regeneration integration, etc.) Compared with the traditional vapor compression cooling system, it is becoming more and more attractive research attention. Many studies have been conducted to improve the overall performance of the DAC system, improve system configuration and optimization by integrating various energy technologies system design and control. This article introduces a literature review of the latest research progress on liquid desiccant dehumidification and air conditioning systems.*

Keywords: Dehumidification, Liquid Desiccant, System Integration

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Evaluation of Wax Plugging Countermeasures on a 20 Inch Underwater Crude Oil Transportation Pipe for 30 KM

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Abstract. *Sedimentation of wax can cause the pipe's internal diameter to decrease and the pipe to clog. The wax build-up due to the long residence time of oil in the pipeline will affect low production rates of crude oil. Long oil residence time, causes heat loss of the fluid as well. The temperature of the oil transportation environment is also one of the factor that influence the wax formation where the temperature under the sea is lower than on open air, so that the temperature drop in crude oil occurs more quickly and wax formation will occur more frequently. In one of the work units at X company, there is a plugging problem caused by wax in the transportation of crude oil under the sea for 30 km. Therefore, this research aimed to obtain several scenario and operational condition including the investment cost from each scenario to overcome the plugging problem and reduce the production loss. The selection of the best scenario for the plugging problem is determined through the most minimum investment cost and the maximum temperature at platform B. From the evaluation, scenario with Increasing the fluid temperature using immersion heater in platform A inlet has the lowest investment cost of Rp. 6,104,567,608 and highest temperature at platform B of 65.64 ^{o}C.*

Keywords: crude oil, plugging, investment cost, underwater transportation oil, wax

Analysis and Simulation of Flare Gas Recovery to Increase Plant Energy and Economic Efficiency: A Study Case

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ABSTRACT. *Environmental issue and energy losses is the main issue for flaring system in oil refinery plant. The expanding capacity of current refinery plant resulting bigger flaring output for Balikpapan refinery. While there are currently available solutions to reduce the impact, the implementation of reducing and reusing flare gases generally brings additional question regarding the technical, economic and environment aspect. Technical and economic assessment for proposed flare gas recovery configuration is the main objective of this study. The study is carried out using the process simulator Aspen HYSYS V.11 for the simulation model, and economic evaluation is carried out for the proposed model. Recovered Flare gases will be utilized as fuel gas supplement of Balikpapan refinery and greatly expected to bring a significant improvement in the savings of fuel gas requirements for the company, reduce the CO2 emission and remove the negative impact of flaring to environment. Alternative technology using Liquid Ring Compressor (LRC) with amine solvent as the liquid ring for recovering flare gas is also available to find better economic. The result showed that flare gas recovery system significantly recovers yearly energy correspond to 330.3 TJ or 291 MMSCF/year and reduce 63 M ton yearly CO_2 emission.*

Key words *Flare gas, Flare gas recovery, simulation, energy efficiency.*

Hydrodeoxygenation of Bio Oil Produced by Co-Pyrolysis of Polypropylene-Crude Palm Oil using Self Gas-Inducing Impeller Reactor

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Abstract. *Polypropylene (PP) can be utilised as hydrogen donor for expulsion of oxygen from crude palm oil (CPO) intended as biofuel. In the present research, hydrodeoxygenation of bio-oil produced by co-pyrolysis of PP-CPO has been done in a reactor equipped with self gas-inducing impeller that enhances the hydrogen gas bubble break-up and collision between the small bubbles, bio-oil and catalyst particles. The enhancement can be achieved due to high shear stress generated in liquid phase and possible suppression of mass transfer resistance of products away from catalyst surface. This arrangement may exclude the use of solvent. The reaction was operated at a constant pressure of 15 bar and different temperatures (100, 150, and 200^oC) with stirring speed of 400 rpm. $Ni/SiO_2.Al_2O_3$ was used as catalyst. The bio-oil feed contains high amounts of carboxylic acids, alkenes, alcohols. GC-MS analysis of the bio-oil products shows that increasing temperature from 100^oC to 150^oC decreases carboxylic acid content and increases ketones indicating that ketonic decarboxylation has occurred. However, further increase in temperature to 200^oC leads to significant increase in carboxylic acids. This may occur due to low hydrogen to carbon monoxide ratio surrounding the catalyst in the absence of solvent. Hence, dilution of bio-oil feed by a solvent is of importance to keep high hydrogen to carbon monoxide ratio to allow reduction of carboxylic acid to alkanes.*

Keywords: Hydrodeoxygenation, pyrolysis, bio-oil, palm oil, polypropylene, self gas-inducing

Effect of Printed Circuit Board Electronic Pyrolysis Temperature on Carbon Particle Mass

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Abstract. *Electronic waste (e-waste) is one of the problems being faced in the world. The amount that reached 53.6 million tons of electronic waste in 2019 is a relatively large number. The number that continues to increase every year requires a management of the problem of electronic waste. One way that can be done is by recycling. Pyrolysis is a technique that can be used to recycle electronic waste. In this research, pyrolysis was carried out on one of the electronic wastes, namely PCB (printed circuit boards). PCB is burned at a temperature of 300, 400, 500, 600 and 700 ^{o}C. The experimental results were determined using digital balance. The maximum carbon particle mass obtained was at a pyrolysis temperature of 500 ^{o}C with a mass of 1.49 grams.*

Keywords: electronic waste, printed circuit board, pyrolysis, carbon

Synthesis of Polyisobutylene (PIB)-Based Fuel Additive and Evaluation of Its Physical and Chemical Properties

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Abstract. *Polyisobutylene (PIB)-based fuel additives are saturated hydrocarbon polymeric compounds with widespread commercial applications used as dispersant to keep engines wall clean and to avoid the formation of gum and sludge in the combustion engine. Polyisobutylene was modified with phenylethanolamine (PIB-PEOH) to produce high quality deposit control additive. Chemical characterization of synthesized additive using FTIR, TGA and LC-MS/MS are also described in this work. The physical properties, such as density and viscosity, were evaluated to confirm the formation of desired product and its prospect for commercial application.*

Keywords: Deposit-control additives, phenylethanolamine, polyisobutylene

Recycling Solvent Organic Waste of Used Lube Oil by Fractional Distillation Process

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Abstract. *A recycling process was developed for the recovery of solvent. Recycling will help the environment with the impacts of hazardous chemicals such as solvent organic waste. This paper objective was to study the fractional distillation process for recovering solvent organic waste of used lube oil. The key parameters considered are time (510, 90, 60 and 30 minute) and temperature (115°C, 125°C, 135°C, and 145°C). The experimental result of organic solvent purity was analyzed by Fourier Transform Infra Red (FTIR) Spectroscopy. The best result was obtained in distillation temperature 145°C.*

Keywords: FTIR, organic, lube oil, recycling, waste

Analysis Of The Effect Of Rice Husk And Teak Wood Powder Mixed Bricket Composition And The Addition Of Lapindo Mud On Physical Parameters And Combustion Rate

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Abstract. *Briquette is one of the fuels derived from biomass. The biomass used in this research is rice husk and teak wood powder. This study aims to determine the effect of variations in the composition of rice husks and teak powder with variations of adhesives and Lapindo mud additives on the physical parameters and combustion rate of briquettes. The results of this study indicate the density value, water content value, ash content value and combustion rate, namely in the testThe density value obtained in the testing of rice husk charcoal briquettes and teak wood powder charcoal with adhesive and clay is (0.8 - 0.9), The value of the moisture content obtained in the testing of rice husk charcoal briquettes and teak wood powder charcoal with adhesive and clay was (4.24% - 6.93%.), the ash content value obtained in the test of rice husk charcoal briquettes and teak powder charcoal with adhesive and clay by (18.36% - 32.27%.). Based on the density value, water content value, and ash content value of briquettes, it can be concluded that in this study briquettes with rice husk charcoal and adhesive wood sawdust charcoal as well as additional ingredients of Lapindo mud with a composition of 50%: 20%: 30% have good quality briquettes. better than other compositions. Meanwhile, the burning rate of rice husk charcoal and teak powder charcoal has the lowest value obtained at 0.004 gram/second with a composition of 50%: 20%:*

Keywords: Briquettes, Rice Husk, Teak Wood Powder, Density, Moisture Content, Ash Content, and Combustion Rate.

Control of Blood Glucose Level For Different Type 1 Diabetes Mellitus Subjects: *In-Silico* Works Using Improved Hovorka Equations

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Abstract. *One of the most common types of diabetes is Type 1 Diabetes Mellitus (T1DM). This condition causes high or low blood glucose levels (BGL) in a patient's body. The current goal of this research is to maintain the BGL of the patients in a safe glycaemic range which is between 4.0 and 7 mmol/L. Thus, it is a high time as to find the optimum insulin infusion rate into the patient's body for the BGL and to differentiate the profiles of BGL versus time for all the T1DM in achieving normoglycaemic range. Previous workers had focused on employing the improved Hovorka equations via in-silico study using one T1DM patient's data; however, in-silico works employing more actual patient's data are yet to be explored. This study focuses on one factor which is the meal disturbance which varies depending on the time of day and the body's weight for three different T1DM subjects. The calculation of the ideal dose of insulin is done using the values of calories required by the age group. Results showed that different amounts of administered insulin (U_t) namely: 0.1 U/min, 0.05 U/min and 0.0167 U/min were required to reduce the BGL within safe glycaemic range (4 mmol/L to 7 mmol/L) with different amounts of meal (D_G) taken by each patient during breakfast, lunch and dinner times. This proved that all the selected administered insulin dosages worked at optimum infusion rate to regulate the BGL. In conclusion, this study had proven that the improved Hovorka equations can be used to simulate the meal disturbance effect on BGL for T1D patients. It is recommended to add other factors that influenced the BGL such as stress and daily exercise to get more proven results in future works.*

Keywords: Hovorka Model, Type 1 diabetes, Blood glucose level, Meal disturbance.

Abstract List

The 6th

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Infrastructure (Civil & Architecture)

Biophilic Design: Virtual Nature Application in a Windowless Room

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Abstract. *Biophilic design recommends the connection between humans and nature because it has a positively influences human health and well-being. Due to the pandemic, some humans have been forced to work at home or in windowless rooms. This situation makes occupants unable to connect with nature. One solution in biophilic design is to present natural substitute elements such as virtual nature to reconnect nature in spaces that cannot access it. This paper discusses the application of virtual nature in windowless space which aims to help users get positive benefits for affective well-being (AWB) such as emotions and moods. This paper is compiled through literature exploration by synthesizing various previous research results. Based on several studies, it shows that virtual nature is not just replacing the real nature but is a boundary of the interior that reconnects with nature. This connection emotionally determines the quality of the windowless room so that it has benefits for the well-being of the occupants, especially affective well-being (emotions and moods).*

Keywords: virtual nature, biophilic design, windowless, affective well-being, boundary

Risk Management to Prevent Delay in Construction Project of Offshore Facility Compression Sub System

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Abstract. *Construction projects for offshore facilities are vulnerable in matter of time, where every risk must be well mitigated to prevent delay, and it is challenging, specially based on the context of this research, where the construction is held in live facility located on offshore (90-150 km from shore base), with sea depth of 80-100 metres and the high wave of South China sea. Identification of risk factors (hypothesis) are arrayed from relevant literatures, and then are sorted by expert validation. Next, these will be examined qualitatively through survey on project managers and project core teams who are well experienced in offshore oil and gas EPC projects. Homogeneity tests on respondents, validity and reliability tests on the data were conducted. Then, they will be analysed by AS/NZ 4360 to gain risk factors priority. Next, the data are evaluated by Kendall-Tau nonparametric correlation test for determining relation between risks and their effect to time performance.*

Keywords: Risk Management, Project Delay, Time Performance, Offshore Project

Development of Safety Plan for Tunnel Project Based on Work Breakdown Structure (WBS) to Improve Safety Performance

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Abstract. *The development of construction after independent of Indonesia has the consequence of increasing work intensity which has resulted in an increased risk of accident in the construction field. One of infrastructure project that has high risk is Tunnel Project. This also results in increased demands for preventing accidents of various types of accidents. Occurrence of accident at project can be prevented trough a good occupational health and safety management system. Health and Safety Management will be optimal if it begin with a good Safety Plan. And Safety Plan will be accurate if it based on Work Breakdown Structure (WBS). The results of this study are the analysis of potentially dangerous sources of risk based on Work Breakdown Structure (WBS), making safety plan development based on Regulation of Minister of Public Works and Housings No.10/ 2021 with standardized WBS,with the aim on improving Safety and Health performance, So it can reduce the number of potential accident especially at Tunnel Project*

Keywords: Work Breakdown Structure, Safety Plan, Tunnel Project

Analysis of Delay Factors in The Stage of Development of State Buildings in The Department of Human Settlements, Spatial Planning, and Land Affairs of DKI Jakarta Province

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Abstract. *Construction project delays have become a chronic disease for the construction world. The implementation of State Building Construction with a percentage of delays of more than 50% of the total number of projects in each Fiscal Year that occurs within the Department of Human Settlements, Spatial Planning and Land Affairs of DKI Jakarta Province requires serious attention. In addition to the magnitude of the impact that occurs due to delays in construction projects, internal conflicts regarding which stages of construction have the most impact on delays need to be resolved. This study is proposed to identify and analyze the construction stages that most influence delays in the construction project of the State Building, so that appropriate strategies can be developed at each stage of construction to improve time performance. A structural equation model that represents the effect of three latent variables from the stages of the construction of the State Building on construction project delays was developed. Data collected from a questionnaire survey and personal interviews from owners, contractors, supervisory consultants, and designers, were used to formulate and further analyze the model. The findings of this study are expected to provide a significant contribution to the efforts of the DKI Jakarta Provincial Government in overcoming the root causes of delays and improving time performance in construction projects.*

Keywords: Delays, State Buildings, Stage of Development, Time Performance, SEM

Evaluation of Land Acquisition as a Strategy for Accelerating Road Infrastructure Development in DKI Jakarta

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Abstract. *DKI Jakarta province needs road infrastructure development to reduce congestion and support community activities. However, the construction of the road is often hampered so that the completion is delayed. Land acquisition is one of the factors that can lead to disruption of road construction. This study aims to evaluate land acquisition then to obtain an acceleration strategy. This study analyzes the application of the land acquisition process which experienced delays in each activity and stage caused by several risk factors. The risk factors obtained from the literature study and developed into several risk variables, then asked to the stakeholders involved through the distribution of questionnaires. Risk assessment as an evaluation of land acquisition based on the level of impact and the level of frequency that occurs produces a rating and level of risk that must be responded to to improve the performance of land acquisition time. Corrective and preventive actions are expected to provide a significant increase in time performance in the land acquisition process, so that road construction can run smoothly, and road ratios increase.*

Keywords: land acquisition, infrastructure development, time performance, risk analysis

EARTHQUAKE-RESISTANT BUILDING CONSTRUCTION IN THE TRADITIONAL ARCHITECTURE OF NIAS ISLANDS

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Abstract. *Indonesia is The country geographically located in the ring of fire area which cannot separate from the natural phenomena of earthquakes. Moreover, buildings in Indonesia not yet supported by earthquake-resistant building technology.*
This paper tries to find out the construction used in the Nias Islands in dealing with earthquakes where it is vulnerable because located at two plates confluence. The method used is to prove that the Nias Islands follows the principles of earthquake-resistant construction based on the guidelines for wood construction applied in Indonesia.
The results are the traditional architecture of the Nias Islands using joints without nails and pedestal foundations (umpak), symmetrical plans, lightweight materials (wooden and sago leaves), and an original construction system called Ndriwa. In conclusion, the traditional architecture of the Nias Islands has met the standard to serve as an example of earthquake-resistant wooden construction that can increase the resilience of buildings in Indonesia today.

Keywords: Earthquake, earthquake-resistant principle, construction system, traditional architecture.

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Development of Notification Tool of Occurrence of Work Obstacles to the Implementation of Tanjung Priok Access Road Construction Project Based on Work Breakdown Structure and FIDIC Conditions of Contracts

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Abstract. *During the execution of Tanjung Priok Access Road (TgPA) construction project, several obstacles were found that could lead to additional costs and time from the Contractor's side. These impacts can be reduced by efforts to overcome the problems that occur, one of the efforts is to develop a guideline to notify the occurrence of obstacles. The work of developing a notification tool of occurrence of work obstacles can include tasks or actions taken to prevent losses from the contractor. To develop the guidance, the scope of work can be compiled using the Work Breakdown Structure (WBS), so that a structured and oriented grouping is obtained, and the activities and work contained in the project defines the overall project scope. The results of this study could recommend resolutions for obstacles that occur in the Tanjung Priok Toll Access Development Project, Section E-2A, which affect cost performance, time and quality.*

Keywords: toll road project, construction, guideline, notification tool of occurrence of work obstacles

RISK EVALUATION CAUSES OF CONTRACT CHANGE ORDER TO IMPROVE COST PERFORMANCE ON RAILWAY CONTRUCTION PROJECT

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Abstract. *In the railroad construction project, there are potential risks that cause Contract Change Orders and has an impact on project cost performance. Risk factors can be seen from three aspects that consist of technical, legal, and environmental aspects. Therefore, the purpose of this study is to analyze the factors causing CCO that have an impact on costs, and determine the steps for managing CCO risk. This study uses a questionnaire to the experts which has experience on railway projects. From the research results, 29 risk variables that affect CCO are grouped into technical, legal and environmental aspects. The factors of design changes, changes in the scope of work and acceleration of the implementation schedule are one of the dominant factors causing CCO in this study. Furthermore, the identified risk factors can be used for the next step, which is to respond to the risk as a risk control strategy. This strategy is expected to improve the cost performance of railway projects.*

Keywords: Contract Change Order, Railway project, Risk analysis

Land Sliding Risk Category along Pipeline Gas Road Based on Risk Matrix Model

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Abstract. *The aim of this study is to categorize land sliding risk along 30.7 km pipeline gas road or pipeline right of way uses risk matrix model. Land sliding risk categorized shall help Company to make decisions to priority mitigation action and optimize budget allocation for road repair and maintenance. Three zones are used in the matrix to define land sliding risk level; which are: low risk, medium risk, and high risk. The author identifies all possible risks from the literature review and site observed data and then use Risk Matrix Model to classify and categorize the risk level of 472 points location along 30.7 km total length of pipeline right of way. The analysis of 472-point locations indicates that 150 locations are in low risk, 261 locations are in medium risk, and 61 locations are in high risk.*

Keywords: road, right of way, land sliding, pipeline, risk category, risk matrix

The Effect of ISO 9001:2015 Implementation on Project Performance and Business Continuity at Construction Companies in Jakarta

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Abstract. *The phenomenon shows that the construction companies with ISO 9001: 2015 cannot correctly apply all the necessary clauses. This study aims to provide empirical evidence of the quality implementation of ISO 9001:2015 on project performance and business continuity. The research population is a construction company in Jakarta, the instrument is a questionnaire, and the respondents are management and employees of a construction company with ISO 9001:2015 certification. The sample was convenience sampling, and respondents are 46 people who came from 46 construction companies. The results showed that the quality of implementing ISO 9001: 2015 has a significant effect on project performance and business continuity. Furthermore, project performance has a significant effect on business continuity. Therefore, the research implication is that construction companies are significant in maintaining the quality of implementing ISO 9001:2015 to achieve good performance and business continuity.*

Keywords: ISO 9001:2015, Quality, Project Performance, Business Continuity.

Motorcycle Traffic Accident Model Based on Riding Behavior (Case Study of Kupang City, East Nusa Tenggara)

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Abstract. *Motorbike users are still lacking awareness about driving safety. Kupang city as the provincial capital of East Nusa Tenggara (NTT) accounts for the largest number of accidents in NTT with 70% of the total accidents involving motorcycles. Since humans are posing as the main factor in traffic accidents, it is crucial to measure the extent to which driving behavior affects and causes road accidents. The measuring instrument used is the Motorcycle Rider Behaviour Questionnaire (MRBQ) which is adjusted for riders in Kupang city. The research is performed with the multivariate logistic regression analysis method. The data collected is then analyzed with the multivariate logistic regression method. Out of 6 variables of the MRBQ questionnaire, Safety Violations are the most dominating in an occurrence of a motorcycle accident in Kupang city as well as the Traffic Violations, with a model obtained is* $logit\ (p)=12{,}749+(-0{,}189)_{traffic\_violations}+(-0{,}111)_{safety\_violations}$

Keywords: motorcycle, MRBQ, riding behaviour, traffic accident

Analysis of Suroboyo Bus Operational Performance Based on Passenger Perception

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Abstract. *In 2018, Government of Surabaya city issued a policy of transport public to operate Suroboyo Bus. It is one of the ways to minimize the problems of congestion which occurred in the city of Surabaya. However, the operation of the Suroboyo Bus is still not optimal. Therefore, an analysis of the performance of Suroboyo Bus was conducted. Suroboyo Bus performance parameters used the sources based on Land Transportation Decree No. SK/AJ.206/DRJD/2002 and SPM TransJakarta. The total performance obtained by Suroboyo Bus for the north-south route is 23, the west-east route is 24, and the Merr route 22. Overall, the values of performance criteria by Suroboyo bus are good. The assessment criteria refer to the SPM Trans Jakarta standard, namely the waiting time for the north-south route, after all, calculations, assessments, and matching of headway performance, and travel speed of each Suroboyo bus route are not appropriate to the TransJakarta SPM standard.*

Keywords: Suroboyo Bus Performance, SPM TransJakarta Standard, SK/AJ.206/DRJD/2002

Abstract List

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Electrical and Electronics

Comparative Analysis of Electronic Waste Treatment in Indonesia with ITU-T Standard L.1031

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Abstract. *Along with technological developments, many aspects on its side have also changed, one of which is Electronic Waste (E-Waste). The increase in Electronic Waste which is increasingly worrying every year is an important thing to raise to find out the best processing procedure to minimize all the bad effects caused by E-Waste. In the processing procedure, internationally some standards regulate, one of which is ITU-T L.1031. This standard consists of guidance on developing an e-waste inventory approach for designing e-waste prevention and reduction programs, and necessary supporting measures. Ideally, the application of this standardization has occurred in developed countries, but what about developing countries? Indonesia was appointed as one of the developing countries to compare the use of this standardization and the processes that have been implemented for a long time in Indonesia. By looking at the advantages and disadvantages between scenarios that use Standard ITU-T L.1031 and scenarios that have been implemented in Indonesia, a procedure that is considered ideal will be designed, as the expected output of this research. Where the design procedure obtained can have a good impact in dealing with electronic waste in Indonesia. In the end the scenario obtained by using the system on differentiate the advantages and disadvantages of the two types of scenarios. After obtaining these advantages and disadvantages, the best scenario will be obtained and can be carried out in Indonesia.*

Keywords: E-Waste, ITU-T L.1031, Indonesia, Scenario, Procedure

Recommendations Development for Country Frameworks on E-Waste Management Referring to ITU-T Standard L.1030

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Abstract. *Our dependence on technology causes the rapid increase in the use of electronic devices which increases the amount of E-Waste produced. Most of the E-waste is categorized as hazardous and toxic waste, which has very high impact on the environment and health. The United Nations predict the amount of E-waste will reach 74 and 120 million tons in 2030 and 2050. There are many methods in handling E-waste, such as proper categorization of E-waste and recycling process. In order to be more effective on handling E-waste, a recommendation for a state framework for E-waste management is drawn up. This recommendation is based on the ITU-T L.1030 standard. Among the recommendations are building an E-waste management design system, general legal requirements such as financing models, collection and processing phases, to law enforcement and sanctions mechanisms. These recommendations can be used for policy makers to build a better system when discussing E-waste.*

Keywords: E-waste, framework recommendation, E-waste management, standards

Canalization of Household Electronic Waste in Indonesia

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Abstract. *The novel pandemic force us to use electronic devices to communicate. One of the examples of the changes of electronic usage is not only in daily life but also the new Working from Home (WFH) system that uses digital platform. The use of electronic devices has been more efficient than before, it covers online school activities until online shopping. Electronic that has been used for daily life are handphone, refrigerator, fan, computers, light bulb, and washing machine, however, every electronic device has their own useful life therefore will be an electronic waste at the end. The forementioned electronic waste can harm the environment since it contains harmful substance, including mercury, manganese, lead, lithium, and cadmium that will not be unraveled for a long time. Therefore, Author wants to make this paper to gain knowledge on the e-waste disposal management in Indonesia, especially household e-waste using questionnaire. The findings in this paper there are 3 of 4 case activity resell their e-waste to second-hand market.*

Keywords: E-waste, e-waste management system, standardization.

Integrated Strategy Framework To Improve Quality Of Network on The BMKG Communication Network System

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Abstract. *BMKG (Meteorology, Climatology and Geophysics Agency) is an organization with a service function that provides information on Meteorology, Climatology, Air Quality, and Geophysics. Good data management is the main focus of BMKG's business activities to produce fast, precise, accurate, wide-coverage, and understandable information. A reliable and speedy Local Area Network (LAN) and Wide Area Network (WAN) communication infrastructure can help analyz e data and disseminate public information. To get the quality of the communication network system, the authors measure network parameters on the network infrastructure at BMKG, such as access speed and transmission capacity, from the sending point to the receiving point. The parameters used are jitter, delay (latency), packet loss and throughput. This measurement uses the Iperf/Jperf tools to measure throughput bandwidth and packet loss in a network system. This QoS parameter follows the standards set by the Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON). The results and analysis of QoS measurements show that, in general, some buildings during office hours and non- office hours show good results. To excellent results, ideally the TIPHON standard, the authors describe the proposed integrated framework, including the End-User layer, the application layer, the system layer, the investment layer and the hardware layer. The proposed integrated framework is a concept to improve better the quality of network services. So that, in general, it can produce the outcome of improving the performance of the network system, especially in the BMKG and can minimize economic losses to social impacts, in this case, a disaster.*

Keywords: BMKG, Iperf, Infrastructure, Integrated Framework, TIPHON, QoS

Optimation Electrodeposition with Adaptive Deep Neural Network (DNN) for Rectifier in Painting Process

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Abstract. *Passenger cars as product transportation need improve relate to competitive price especially Electrodeposition (ED) in the painting process requires high cost. High cost caused thickness ED not balance and far beyond the standard 15 μm (less optimize). Input in form of current and voltage value as data parameters are processed with DNN to provide input responses in various conditions determined by the threshold through feed-forward backpropagation. The voltage regulated by thyristor pulse can adjust voltage for in ED process to even out the paint thickness throughout is close to the standard. The results obtained from the system simulation show that the thickness can be more optimize and cost reduced better 40% cheaper compared to the previous condition. Accuracy simulation of system DNN is faster response and rectifier voltage predict is 99,99% same relate change current value.*

Keywords: electrodeposition, rectifier, deep neural network, pulse width modulation

The Characteristics of Harmonics Generated by Induction Cooker for Different Power Setting

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Abstract *Induction cookers use coils as an intermediary current from a power source that is used as a heat conductor. An electric current conducts the coil causing an oscillating magnetic field around the coil which can induce ferromagnetic equipment. This creates heat in the utensils that can be used for cooking. The heat generated by the induction cookers can be adjusted based on the desired electrical power. The difference in power setting of the induction cooker causes the harmonic effect on the voltage and current. Based on observations, the dominant order voltage harmonics occur in the 5th order with a range of IHDv 2,72V-4,53V and the dominant order current harmonics occur in the 3rd order with a range of IHDi 0,08A-0,10A. The result of measurement shows that range of THDv values 2,53%-3,59% and the range of THDi values 1,61%-2,96%.*

Keywords: Induction cookers, Harmonics, Total Harmonics Distortion (THD)

Optimization of The Ereke Electricity Generation System Development

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Abstract. *The Ereke system was an electrical system used on the northern Buton island, a part of the North Buton Regency. The operating methods on the Ereke system were the operation method which was supplied from Baubau system and, in some conditions, isolated operation. There were several conditions caused by those operating methods, which were the poor voltage quality due to the geographical distance from Ereke to Baubau that were too far (±170 km) and the long duration of the normalization process if there was a widespread blackout since Ereke was located at end of the network. In addition, the Ereke system experienced a total of 76 outages in 2020. From the analysis result, it was obtained that the operating method which was supplied from the Baubau system will cost Rp. 1,159,452,439.9/month with 15.6 kV base voltage and a long normalization duration after blackout/total blackout. On the other hand, it was also obtained that the isolated operation method will cost Rp. 1,622,262,413.2/month with 19.7 kV base voltage which was more expensive but with a shorter normalization duration after interruptions due to shorter network and the decreased network loss. Therefore, developing interconnection of Ereke system and Baubau system along with the constructions of feeders to increase the voltage quality and reliability also with the use of DigSilent simulation software will improve the quality of electrical generation development in Ereke. The latest RUPTL (2021-2030) was considered through every analysis.*

***Keywords**: Ereke System, Operation Method, Reliability.*

Hemoglobin Non-Invasive Measurement on Multi Wavelength Pulse Oximetry Method with Linear Regression and XGBoost Algorithm

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Abstract. *Hemoglobin level is a vital parameter to determine the health condition of the human body. Nationally, in 2019, the measurement of hemoglobin levels in health facilities was carried out in an invasive way using the Sahli method. Measurement of hemoglobin levels can be carried out non-invasively using oxygen saturation parameters using the multiwavelength pulse oximetry method. In this study, a non-invasive hemoglobin measurement system was implemented using a multiwavelength pulse oximetry MAX30100 sensor which has a working principle of measuring oxygen saturation levels using different wavelengths of red (660 nm) and infrared (940 nm) emitted reflectively on the fingers. Furthermore, oxygen saturation data will be processed using linear regression algorithm and XGBoost to predict non-invasive hemoglobin levels. Based on the training results, the RMSE on the linear regression algorithm is 0.324898 and XGBoost 0.801085. For testing, the linear regression algorithm has an accuracy rate of 97.9059% and XGBoost is 94.91%.*

Keywords: Hemoglobin, Non-Invasive, Linear Regression, XGBoost

Technical and Financial Analysis of Cofiring the Existing Coal Fired Steam Power Plant 635 MW Gross Output with Sawdust

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Abstract. *Research on Cofiring of the Existing Coal Fired Power Plant with biomass in the form of sawdust with a mixture percentage of 5% was carried out with the main objective of pursuing the acceleration of the renewable energy mix target of 23% (Green Booster) by 2025, with minimal costs. At the initial stage of the activity, testing and analysis of the effect of cofiring will be carried out on several main parameters of the Existing CFSPP's performance with 635 MW gross power output in East Java. In addition, it is also at the same time to get an overview and evaluate if the cofiring plan will be implemented through technical operational evaluations, the cost of production from the aspect of fuel costs (component C) and exhaust emissions to the environment. From the results of monitoring the operating load at around 635 MW (gross) using 5% cofiring, it can be seen that critical points such as main steam temperature, main steam pressure, gas economizer outlet temperature, mill outlet temperature do not show a significant increase, meaning they are still within the operating limits, reasonable and safe. From the calculation of the cost of fuel, the coal price is IDR 594 Rp / kg, and sawdust price of IDR 472 Rp / kg (on site) using the SFC difference of 0.0077 kg / kwh, and the CF assumption of 80% (7,008 operation hours per year), then with an average annual electricity production of 4,415,040,000 kwh / year, fuel savings of around IDR 35.32 billion Rp / year will be obtained.*

Keywords: cofiring, biomass, sawdust

Cluster Analysis of the Indonesian Mobile Subscribers in 3 Provinces : The Case of 4G Wireless Technical Performance

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Abstract. *In this paper we analyze more than 1 million crowdsource data samples of 4G Mobile Network subscribers from three provinces in Indonesia; Special Region of Indonesia (Daerah Keistimewaan Indonesia, DKI), West Java, and Banten. Average download throughput, average upload throughput, and average signal strength are then used to clustering the districts into three categories; Gold, Silver, and Bronze, with the highest to lowest class respectively. Five Indonesian mobile network operators evaluated in five weeks each with significant events from 2020 to 2021. The methodology is based on the k-means algorithm as applied in the software of Tableau 2021.1. The result shows that all operators have comparable performance, while the sub-urban area has lower performance compared to the urban district area, and a festive week like Christmas and Ied Muslim days shows worse performance than other weeks. Finally, we argue that the result can be used to make strategic policies for regions based on their customer experience segmentation.*

Keywords: Clustering, segmentation, Mobile Network Operator, customer experience.

Comparative Study Of Global Navigation Satellite System and Automatic Number Plate Recognition for Electronic Toll Collection

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Abstract. *This study compares advantages of Global Navigation Satellite System (GNSS) and Automatic Number Plate Recognition (ANPR) technologies in Electronic Toll Collection (ETC). Within the scope of Indonesia, the comparative study of the two technologies is conducted using in-depth interviews to three interviewees. The three interviewees come from the government, telematic expert, and academic. Results show that the government said regarding the frequency permit for the use of RFID and satellites as well as an integrated transportation system integration system in the future, the telematic expert explain general aspects and special aspects related to technology that will be utilized for purposes in the payment system Toll road, dan academic described how the process needs of toll road service providers made a decision to make a cashless payment system by benchmarking foreign countries first and how should a system be able to carry out all processes properly for the benefit of internal audit. Given these point of views the ANPR is the good technology for ETC system because more data can be used and can use in the future purphose.*

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Keywords: ANPR, GNSS, ETC, Technology,Toll

Abstract List

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Energy

Analysis of Design Capacity Calculations And Cost Savings From Installing Flare Gas Recovery System (FGRS) At Refinery In Indonesia

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Abstract. *Flare gas recovery in Indonesia became the main program since participating in GGFR (Global Gas Flaring Reduction) partnership and The Zero Routine Flaring by 2030. Two regulations issued by the Minister of Energy and Mineral Resource emphasize reducing flaring in oil and gas activity. Recover the flaring gas into fuel gas utility will reduce the refinery loss and also increase plant performance and efficiency. This paper focused on: determine FGRS design capacity, flare gas recovery system technology to be used, economic feasibility, and environmental advantage. A methodology to decide basis design is presented after analyzing various flare gas compositions and mass flowrate. Design capacity 1,200 Nm3/h by using single liquid ring compressor will give 28% recovery rate percentage and give result economic feasible with $1,433,572 annual return, $4,174,655 NPV of the project, the IRR is 23.6% and payback period 6 years. Conservation energy will reduce emissions equal to 20,885 Ton CO2 after installation of FGRS in the existing flare system in the refinery.*

Keywords: electronic waste, leaching, stripping, NaOH, HCl, H_2O_2, gold recovery

ANALYSIS SUBSTITUTION OF BBM MOTORCYCLE TO ELECTRIC MOTORCYCLE FOR ELIMINATE IMPORT FUEL

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ABSTRACT . *The used of Indonesian fuel in the transportation sector is quite large, which is grows 5.36% per years, which is still use gasoline and used in motorcycles and cars general. The research is focus on eliminating import fuel by substituting from conventional motorcycles to electric motorcycles and provides an overview of the application of electric motorcycles in Indonesia with the implementation of related policies. This research use qualitative methods to analyze the process of applying electric motorcycles and quantitative methods to prove that application of electric motorcycles can eliminate the import of fuel a day in Indonesia. The results showed the use of fuel of motorcycles in 2018 was 388793.25 BBL/day and imported fuel was 320904.74 BBL/day to complete national needs, so it can be said that if the use of electric motorcycles is apply to replaced conventional motorcycles, it can eliminate the import of fuel/day.*

Keyword :*Fuel, Electric Motorcycle, Import*

Comparative Analysis of Machine Learning Techniques to Predict Risk Based Inspection Assessment for Gas Transmission Infrastructure

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Abstract. *Risk-based inspection (RBI) is typically performed to find the optimum inspection plan that can improve the safety and reliability of the production and processing facility. RBI uses equipment risk of failure (RoF) to prioritize inspection, thus allowing the organization to focus inspection resources on equipment with a high RoF. This study aims to determine the risk prediction from onshore gas transmission dataset and a comparative analysis between the performance of the intelligent system and the conventional assessment. The methodologies are libraries import, import and visualize dataset, data cleaning, model training & test, improving the model and do comparative analysis. The results are with logistic regression (LR) and support vector machine (SVM) match 100% by improving the model, k-nearest neighbors (k-NN) match 100% by finding the optimum k value, random forests (RF) match 100% with finding optimum number of trees and decision trees (DT) match 100% with its algorithm.*

Keywords: Risk Based Inspection, Risk Prediction, Comparative Analysis, Machine Learning

Comparative Analysis of The Economic Value and Emission on Electrical Car Charging Between PLN Electricity and Solar cell

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Abstract. *Electric car is growing rapidly in Indonesia and charging electric vehicle (EV) during grid peak hours can give additional burden to the grid. One of the solutions is by shifting charging time to off-peak hours. Putting charging station in office building and fulfill charging demand during office hour at lower price than standard grid can attract owner to charge their EV at off-peaks hours. This study is to analysis the environmental benefit of charging EV using solar photovoltaic (PV). Using the standard grid charging as comparison, is found that solar PV charging is 40% cheaper than standard grid and more than 70% cheaper if compared to gasoline vehicle. Also, with bottom-up approach using fuel-based method the result of CO_2 total emission per person (TEPp) can be more than 90% lower compared to gasoline vehicle when EV is charged by solar PV.*

Keywords: PV charging station, CO_2 electric vehicle, photovoltaic, cost saving EV charging

Improving the Community's Economy During the Covid19 Pandemic Through Energy Saving Culture

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Abstract*. The existence of the Covid-19 pandemic has become the toughest challenge for the social, economic and welfare development of the world today. In a relatively short time the Covid-19 pandemic has drastically changed the direction of global development from economic recovery to the threat of a health crisis and an unavoidable recession. With the influence of Covid-19 has also had an impact on the Indonesian state. The impact can be felt by all groups from the upper middle class to the lower class. Problems began to increase so that the emergence of problems from the energy sector. Development and Infrastructure Energy development in Indonesia had stalled. In supplying electricity, Indonesia still relies on fossil energy, namely coal. The Covid-19 has caused coal prices to fluctuate and tend to increase. Meanwhile, the needs of the community are bound by the electricity supply which is the main need of the community in carrying out activities. For this reason, a strategy for saving electricity consumption is needed by carrying out an energy-saving culture to the community, in order to help improve the community's economy and meet the supply of electrical energy in Indonesia. This study tries to analyze qualitatively descriptive of the current government policies related to the electricity sector. The government's way of meeting the electricity needs in Indonesia during the pandemic. The strategy of using energy-saving culture is carried out in various groups, especially the community. Strategic recommendations needed to support electricity supply and form of economic savings through an energy- saving culture in Indonesia.*

Keywords: Economy, Energy Saving, Electricity, Clean Energy

Techno-Economic Analysis of Power Plant Installation on Offshore Wellhead Platform by Optimizing the Potential of Renewable Energy

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Abstract. *The offshore wellhead platform development site located in the Madura Sea has a large exposure to solar radiation with an annual average of 5.58 kWh/m²/day and a wind speed of 4.64 m/s which have the potential to be used as a power source to build power plants on the platform. HOMER software is used to analyze the potential of renewable and hybrid energy in order to obtain the most optimal power generation system. Based on this research, the configuration of power generation system using potential renewable energy that can be installed optimally in this platform is a solar panel and wind turbine hybrid power plant which to supply electrical energy needs for 24 hours of 69.26 kWh / day with a power system configuration of 20 kW wind turbine, 8.78 kW solar panels, 104 units batteries and the 5.8 kW converter system capacity. From the economic aspect, the Net Present Cost (NPC) is Rp. 1,241,917,000 with an Initial Cost of Rp. 583,930,339.27, Operational Cost of Rp.40,595,100 and Cost Of Energy (COE) of Rp. 3,033.20.*

Keywords: hybrid, photovoltaic, wind power, HOMER

Coal and Dimethyl Ether Price Modeling Analysis as Coal-Downstreaming Activity Supports

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Abstract. *To improve national energy security in Indonesia, alternative energy is needed to substitute the use of the LPG. As to reduce the dependencies to other countries due to the use of imported LPG, the DME processing would be utilizing and optimizing the low-quality coal into valuable gas, equal to the LPG. In 2028, the demand for LPG for domestic consumption is estimated at 9.4 million tons, as 8 million tons met through imports. To support the DME development projects, various regulations have been made by the Government of Indonesia, especially in terms of the coal price, such as the reducement of royalties and corporate income tax up to 0%. As the coal price determines the price of the DME, a study has been carried out using a coal price scheme in the forms of: the basic price of coal, coal benchmark price, and coal price for mine-mouth power plant. Assuming the DME price is 70% of the LPG market index price, to get the IRR of 10% from the DME process, a coal price of 19 USD/tonne for low-quality coal and 39 USD/tonne for medium quality coal is projected.*

Keywords: DME, LPG, Coal

Reflector Design to Optimize Bifacial Solar PV Modul Output

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Abstract. *Solar energy is the biggest potential energy source on earth. solar cells convert sunlight directly into electricity which is known as photovoltaic (PV). Currently, Bifacial PV is promising used because it has a higher conversion energy rate than Mono-facial PV. The existence of 2 sides on bifacial PV (top-down) will produce higher power energy, the main problem is the energy conversion from bifacial PV is not maximized yet. to get maximum results, Bifacial PV requires a promising reflector design by measuring the PV tilt angle, the distance between the PV and the reflector, and the color of the reflector. The PV 200 seaward measuring instrument which is a measuring instrument for the electrical parameters of the PV mini-grid system that meets the standards of IEC 62446 and IEC 61829 is also used to measure the power generated. The design of the reflector module with a tilt angle of 5°, the distance between the PV and the reflector is 10cm (flat PV-reflector) and using white as the color produce the best power from reflected sunlight irradiation, to obtain a design that can improve and optimize bifacial solar PV. This study aims to design a reflector module for bifacial solar panels to improve and optimize the performance resulting from the reflection of the reflector at the bottom of the bifacial solar panel.*

Keywords: Solar, bifacial PV, reflector

The Future Prospect of the Application of Local Fruit Waste Derived Dye-Sensitized Solar Cells in Indonesia

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Abstract. *In 2019, Indonesia ranks as the 14th largest consumer of electricity globally. Indonesia consumes over 275 terawatt hours (TWh) of electricity in 2020 alone, and the ministry of energy and mineral resources (ESDM) states that the number is projected to rise to 1026 TWh by 2038. This immense electricity demand is alarming for Indonesia, as in 2020, 85.31% of total energy consumption is from fossil fuels, and a staggering 581 metric tons CO_2 of greenhouse gases are emitted in 2019. This uproar of demand for sustainable and green renewables provides dye-sensitized solar cells (DSSC) the spotlight to be an exceptional candidate for economically-viable and environmentally friendly means of clean energy production. Recently, there has been a trend of utilizing natural dyes derived from the pigment anthocyanin typically found in fruits such as avocados, pomegranate, and dragon fruit to fabricate sensitizers that absorb photons from the radiation emitted by sunlight and convert them into electricity. The prospect of sourcing natural dyes from local fruit waste for the development of relatively inexpensive renewable energy technology is promising for a biodiverse and tropical country like Indonesia. Furthermore, the application of DSSC for electricity production follows the national energy policy from the ESDM, which aims for a renewable transition and targets that by 2025 at least 23% of total electricity production will be produced from renewable sources. Therefore, this research is conducted to analyze the potential natural dye derived from local fruit waste for DSSC application in Indonesia.*

Keywords: Dye-Sensitized Solar Cells (DSSC), Natural Dyes, Local Fruit Waste, Anthocyanin, Sustainable Energy, Renewable Transition.

Determining the Thermal Conductivity of Natural Fibers with Axial Flow Method

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Abstract. *The main focus of this research is the characterization of the thermal conductivity of pineapple fiber, ramie fiber, and luffa fiber. These three fibers will be used as cooling pads for indirect evaporative cooling with an added heat pipe as a heat exchanger. The characterization of the thermal conductivity of pineapple fiber, ramie fiber, and luffa fiber was investigated experimentally by using a thermoelectric-based thermal conductivity apparatus. The principle of this tool is to make a temperature difference between the two ends of the material. One end is given the heat, while the other end is maintained its temperature by flowing cooling water. Based on the test results, it was found that the thermal conductivity value of ramie fiber has the highest thermal conductivity value at a temperature of 35 oC at 0.2297 W/mK. Meanwhile, the thermal conductivity value at a temperature of 35 oC from luffa fiber is 0.0459 W/mK and pineapple fiber is 0.1746 W/mK. So that it is obtained that the cooling pad in ramie fiber transfers heat greater than that of luffa fiber and pineapple fiber.*

Keywords: thermal conductivity. hemp luffa. pineapple. evaporative cooling.

ANALYSIS OF POWER GENERATION SECTOR ROAD MAP TO ACHIEVE NET-ZERO EMISSION

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Abstract. *This study assesses Indonesia power system's transition pathway to reach Net-Zero Emission (NZE) target in 2060. The pathway is determined based on least-cost optimisation in the Balmorel model using yearly demand and supply operational profile using 24-h time slices. Balmorel is a partial equilibrium model written in the GAMS modelling language for simultaneous optimisation of generation, transmission, and consumption of electricity. Model using 2 different scenarios, RE scenario to maximize renewable energy and the other is CCS scenario optimizing renewable while also consider Carbon Capture Storage (CCS) on natural gas and coal gasification based powerplant (IGCC). Both scenarios take massive reduction on usage of coal based power plant. From this study, it can be concluded that biomass and solar PV utility-scale will play an essential role in the first scenario up to 258.7 GW and 159.2 GW, corresponding to 583.8 GW total installed capacity in 2060. Then the other scenario shows Integrated Gasification Combined Cycle with CCS (IGCC CCS) and solar PV have massive role with 170.1 GW and 152.7 GW from 559 GW of total installed capacity in 2060. The cumulative investment cost until 2060 shows that CCS scenario is 5.7% higher than RE, around 1,295 billion USD and 1,225 billion USD respectively, and CCS scenario also still have emissions of 66 million tons of CO2e in 2060, while the RE scenario has a negative value of emissions from the use of biogas reaching -4 million tons of CO2e.*

Keywords: net-zero emission, power generation planning, balmorel model, renewable energy, carbon captured storage (CCS)

Abstract List

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Analysis of the Influence of the Implementation of the IEEE 7010 Standard on the Shopee and Tokopedia Platforms

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Abstract. *E-commerce platforms are very helpful in meeting people's needs in the midst of the current pandemic. To meet consumer needs, e-commerce companies continue to develop their platforms by incorporating Artificial Intelligence (AI) systems. AI systems have both positive and negative impacts on human well-being. Well-being is very important because it will determine a person's quality of life, so a tool or method is needed to measure the level of well-being due to the impact of the AI system. The IEEE 7010 standard recommends five activities to measure the impact of AI systems on human well-being. This standard is applied to the Shopee and Tokopedia e-commerce platforms. The results of the review on the platform show that Shopee has 6 dashboards and Tokopedia has 8 dashboards which are well-being indicator dashboards. Shopee and Tokopedia have also carried out five activities that are based on the IEEE 7010 standard. Of these five activities, there are several policy steps and strategies that are proposed to be used by Shopee and Tokopedia companies in improving well-being, namely improving AI systems, more accurate data processing, development dashboard, the use of consumer review data as analysis data, and the time period used to analyze the data.*

Keywords: AI, Well-being, Shopee, Tokopedia.

Evaluation to Reduce Potential Dead Stock of Production Component on Inventory of Automotive Industry Plant

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Abstract. *Competition in the industrial sector, especially the automotive industry is highly competitive. It takes innovation in the form of new models, competitive prices, service to the customers to be able to compete in the market. This rapid change model of the vehicle has an impact on changing the design of the component and part quality, so that it will have the possibility of unused components will be increase. Therefore, this research aim to evaluate project development & production plan to optimize stock utilization. This research was conducted with case studies on the automotive company. Found several factors that can be considered in developing a new model based on the losses incurred. Project development based on stock, component unification is the most important factor to reduce the potential dead stock components. The result of the research will be used to optimization cost of project development & production plan.*

Keywords: automotive, industry, material, inventory, dead stock

Analyze Factors That Impact Growth of E-Commerce Users with DeLone & McLean Model

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Abstract. *D&M Model is a systematic model to determine the capability of an IT product based on customer satisfaction and number of users. In terms of E-Commerce, several studies have analyze with D&M model to determine how these factors affect the customer satisfaction factor and number of users. Artificial Intelligence currently is widely used in E-Commerce such as Chatbot for improving Customer Service and affect the Service Quality. However, there's external factors that can affect E-Commerce Goals such as penetration of Promos & Advertisements. This paper is to evaluate by adding External Factor into the D&M model and show that External Factors have a greater influence than the QoS offered by AI. It's coherent with the nature of IT Products, namely Network Externality. To achieve a it goals, company can use Promos or Ads as an External Factors to increase number and user and customer satisfaction.*

Keywords: D&M Model, Artificial Intelligence, Service Quality, External Factor, Network Externality.

Model Conceptualization on Understanding the Music Business Model of Independent Artist in Indonesian Music Industry

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Abstract. *Rapid development of information technology has driven changes in strategy and business model in Indonesian music industry. The Internet of Things transformed the industry more dynamically by the emergence of technological development in production, distribution and consumption of music products. Digital streaming services and social media networking are heavily affecting all of the aspects in the business. Although physical music product sales have been falling and record labels are struggling adapting their business in recent years, more opportunities are opened for independent artists to grow with the technological changes. Independent artists are now enabled and recommended to diversify business activities independently from their traditional main focus on creativity and music composition. This challenge needs to be understood integrally, so the development of a conceptual model is needed to explain the challenge due to the music business model of independent artist in Indonesian music industry. System dynamics approach is conducted to specify the complexity of the system in the model. The framework of the conceptual model is created in the form of a causal loop diagram, in order to give better understanding in finding the leverage point for the industry actors to adapt.*

Keywords: system dynamics, causal loop diagram, model conceptualization, music business model, independent artist, music industry

Identification of Sensor Performance Quality Standards as Recommended Standards for Internet of Things (IoT) Technology in Food Supply Chain in Australia

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Abstract. —*In this study will identify the use of applicable standards in the IoT ecosystem and then provide standard recommendations in case studies of IoT technology in the Food Supply Chain in Australia. The research method used is to identify data, identify and review the standards that apply in the IoT ecosystem and then compare with the points of the standards reviewed, so that can provide recommendations and strategies for future evaluation. In this study, it was found that if the sensor performance quality standards were implemented in a case study, it could answer the concerns and become the answer to the desired impact by respondents in implementing IoT in the food supply chain in Australia. Thus, the application of sensor performance quality standards and the proposed standard policies and strategies that have been described are urgently needed in the implementation of IoT technology in the food supply chain in Australia.*
Keywords: IoT, Standards, Sensor, IEEE.

Study of IoT in Food Products Supply Chain Based on ISO/EIC 22417, Case Study of Fish-Based Products in Surabaya

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Abstract. *Food products are one of the sectors that provide economic value to both industry and the public. In the process of sending products from farmers to consumers, the quality of the product must be maintained so that it is still fit for consumption. One way to maintain this quality is the use of IoT where IoT can monitor the state of the product in real time. ISO / EIC 22417 standard can be adopted in this case IoT system. In this paper we study the case of a restaurant in Surabaya for the fish-based product. We propose IoT scenario and analyse the data with descriptive analysis and triangular analysis*

Keywords: IoT, ISO/EIC 2241, food product

Evaluation of the Business Continuity Management using ISO 22301:2019 (Case study on the XYZ Organization)

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Abstract— *Digital transformation acceleration brings organizations to transform business processes into information systems, thus requiring organizations to protect information technology assets. XYZ Organization has already had business continuity management that refers to the standard of ISO/IEC IT Service Management, Information Security Management System, and Quality Management System. In 2019, Worldwide Quality Assurance launched the international standard for Business Continuity Management System (BCMS) ISO 22301-2019. We used the ISO 22301-2019 BCMS standard with ten clauses covering 65 controls to measure the level of BCMS implementation in the XYZ organization. This research was conducted by mapping the current conditions by reviewing documents, interviews, and observations. The validity of the data was carried out using triangulation techniques to obtain a conclusion of readiness, and then a gap analysis was carried out. The results of this study are that there are 34 appropriate controls, 31 controls require the creation or review of procedures.*

Keywords— Business Continuity Management System, ISO 22301, Clause, Triangulation.

TVRI Broadcasting Business Model Analysis Towards the Digital Television Era

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Abstract. *Countries in Southeast Asia have agreed to carry out ASO by the end of 2020. Indonesia, with the ratification of the Law of the Republic of Indonesia No. 11 of 2020 on Job Creation, Indonesia will implement ASO no later than 22 November 2022. Public Broadcasting Institution Television of the Republic of Indonesia (TVRI) is the first television station in Indonesia that has tested digital broadcasts. As a public broadcasting institution, TVRI's competitiveness in the broadcast business is relatively low. TVRI has not been able to attract a lot of public interest to watch their broadcasts. With the presence of digital television, LPP TVRI needs a new strategy to develop its broadcasting business. This study aims to evaluate the business that has been run by LPP TVRI and build a strategy to compete in the digital television era. Based on the results of the SWOT analysis, TVRI's position is at the third quadrant, meaning that TVRI has a large enough opportunity to be accepted by the public and overcome internal problems.*

Keywords: electronic waste, leaching, stripping, NaOH, HCl, H_2O_2, gold recovery

Development Of Interrelated Model Between WBS, BIM, Information System, Web, And OHSEMS for Safety Performance of Construction In Universitas Indonesia Area

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Abstract. *The higher education sector in in most countries is large, growing, includes employers with widely varying organisational cultures, and involves high risk exposures. One of the potential risk happened in higher education sector is construction work accident in campus area. Universitas Indonesia (UI) is one of the highest institutions in Indonesia with area of 320 Ha and 40.000 number of visitors per day, which required the implementation of OHSEMS, as stated in Government Regulation Number 50 of 2012. However, OHSEMS in UI Area is still not optimally implemented so the safety performance of construction needs to be increased by adjusting to a new technology such as implementation of web-based information system, development of WBS and BIM for every construction project in UI Area. The method used in this research is Structural Equation Modelling (SEM-PLS) in finding the interrelated model between WBS, BIM, Information System, Web and OHSEMS to escalate Safety Performance of Construction in UI Area. The result of 7 latent-variables on the Safety Performance of Construction has been analysed using the data from a questionnaire survey of 70 respondents comprising the stakeholders within construction sector, particularly experienced in Health and Safety Environment (HSE). The result of the data analysis shows that BIM (X3) and Web (X5) are the key variables leading the improvement of Safety Performance of Construction in UI Area. With a proven-research and analysis of the important role in context of escalating Safety Performance in Construction, these studies could highly enhance to the development of OHSEMS within the safety construction in campus or higher education area.*

Keywords: WBS, BIM, Web, OHSEMS, Information System, Safety Performance

Improving Oil and Gas Wireline Log Data Quality Using Six Sigma Methods

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Abstract. *Wireline log data is one of the subsurface data that always generated and used in every exploration and production E&P activity in oil and gas industry. The quality of subsurface data will help companies shorten the "time-to-first-oil" and extend the production phase. The Monthly Subsurface Data Management Report shows that from October 2018 to July 2020 there were 20 of 34 incident tickets for data quality information problems that were sourced from wireline log data. This study uses the six sigma DMAIC method to identify problems, measure the quality of wireline log data as a product of oil and gas drilling projects and analyse the main causes of wireline log data quality problems. And finally, at the improvement and control stage recommends some steps that can be taken to reduce the problem and how it will be improved in the future.*

Keywords: Data Quality, Wireline Log, Six Sigma

Improving Queueing System for COVID-19 Vaccination in Indonesia with YoVid Mobile Application Prototype

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Abstract. *COVID-19 vaccination is an activity that is currently intensively carried out in Indonesia. Many people are vying for the vaccine, causing long queues and crowds. Long waiting times and uncomfortable queuing situations can impact people's satisfaction with the services received. Therefore, improvements to the queuing system for COVID-19 vaccination are needed. Queues while waiting for their turn for vaccination are simulated using discrete-event-based modeling simulations to get the results of the ideal number of people in one vaccination batch with a time range of one hour. The simulation aims to prevent accumulation when people are waiting for their turn to be vaccinated. Then, an application prototype named YoVid (Ayo Vaksinasi Covid) was developed to improve waiting times and the comfort level of participants. With this application, it can reduce waiting times and increase participants' comfort while doing a series of vaccine receptions.*

Keywords: COVID-19 vaccination, queueing system, discrete modeling, YoVid mobile application

Abstract List

The 6th

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Evaluation of Smart Mobility Implementation in Jakarta based on ISO 37122 Standards

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Abstract. *Jakarta is not separated from the problem of congestion because of increasing the number of population and the level of urbanization. Furthermore, personal vehicles growth is not comparable with an increase in the length of roads that are not able to accommodate the vehicles. One of the applications of smart mobility is in public transport. Jakarta has wide modes of transport public such as Train Commuter, Transjakarta Bus, MRT, network microbus Jaklingko and LRT. However, to be applied as the corresponding standard, required an evaluation to determine whether the application of smart mobility in Jakarta is already appropriate indicator of the standard. Objective research is evaluation of aspects related to the standard application of smart mobility. The results are Jakarta needs to gradually replace the electric transportation fleet, build a real-time and integrated transportation information system and provide connectivity to the public transportation fleet.*

Keywords: ISO, smart mobility, smart city

IEEE Std 2813-2020 Implementation Analysis Case Study : Tokopedia & Shopee

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Abstract. *The development of e-commerce in Indonesia in recent years is accelerating. E-commerce platforms that are often used by e-commerce customers are Tokopedia and Shopee. In support of smooth e-commerce business using technology called big data. The use of big data technology is not only to support the smooth running of the business, but also to analyze business risks that may occur on e-commerce platforms. To access business risk using big data, you can use a standard issued by IEEE, namely IEEE Std 2813-2020. From the results of the analysis obtained that Tokopedia and Shopee e-commerce platforms use these standards in accordance with the privacy policy of each e-commerce platform. In addition, there are recommendations that can be applied to each e-commerce platform, and there are also several aspects that need to be considered in the use of big data technology on e-commerce platforms.*

Keywords: Big data, e-commerce platform, Standard, Tokopedia, Shopee.

Analysis of MGWS/WiGig Regulations in Indonesia Based on ETSI, ITU-R, IEEE Standards

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Abstract. *Multiple Gigabit Wireless System (MGWS) or Wireless Gigabit (WiGig) is a radio signal network technology with high-speed data transfer services to meet wireless access needs in Line of Sight (LoS) or Non-Line of Sight (Non-LoS) conditions. However, Indonesia still does not have regulations or special requirements regarding the implementation of MGWS/WiGig. Nevertheless, the MGWS/WiGig testing in Indonesia has been carried out by the SDPPI team and the Vendor with reference to the Standard provisions that have been made by the International Telecommunications Union – Radiocommunication Sector (ITU-R), European Telecommunications Standards Institute (ETSI), and IEEE. This journal discusses the need for MGWS/WiGig regulation based on the test results. The results of the discussion are expected to be taken into consideration by the government in determining further technical requirements related to the implementation of MGWS/WiGig. So that Indonesia can maximize the full potential of the use of MGWS/WiGig..*

Keywords: MGWS, Regulation, Standard, Throughput, WiGig

Multiple Gigabit Wireless Systems (MGWS) in frequencies around 60 GHz implementation of Telecommunications, Manufacturing and regulatory recommendations in Indonesia

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Abstract. *Multiple Gigabit Wireless System (MGWS) Network radio communications operate in the unlicensed 60 GHz band, expected to include applied wireless digital video, audio and control applications as well as multiple gigabit wireless local area networks according to industry. MGWS recommended for use on backhaul and fronthaul infrastructure in telecommunication, based on references from ITU-R M.2003-2 and ETSI EN 302 567 V2.2.0 using Wi-Fi ports at 802.11ad. MGWS have parameter is Throughput, Delay, Packet loss that make MGWS from these parameters can be projected challenges and opportunities in the future of economic potential, digital industry, bandwidth limitations, and data rate. MGWS research has the potential to substitute hardware limitations in Indonesia such as Access Point, and Fiber Optic so that the telecommunications industry value investment in development in infrastructure frequency 60 GHz, manufacturing case development car comunication in frequency above 60 GHz comunication in traffic management system, and regulatory policies.*

Keywords: 802.11ad, MGWS, ITU, ETSI, Telecommunication, Manufacture, and Regulatory

Recommendations of Smart Mobility Development in Jakarta Using ISO 37120 Standards

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Abstract. *The city is a residential center with various concentrations of activities and services carried out. Cities are always experiencing development, both in terms of technology, population or transportation systems. Jakarta as the capital city of Indonesia, of course, has also experienced very rapid development from time to time. In this development, of course, many problems are happened, some of the problems that often occur are the increase in population which causes a fairly high-density level, and indirectly this has an impact on the increase in the number of transportations, which causes a fairly high level of congestion in several roads in Jakarta. The concept of a smart city that focuses on smart mobility can be a solution in dealing with these problems. Smart mobility is based on public transportation, aiming to improve transportation services that are fast, safe, comfortable and affordable by the community. Several development strategies have been carried out, for example, the strategy of increasing the number of bus fleets so that they can improve services to the community, the strategy of providing information service facilities on public transportation so that it is could be real time, the strategy of providing feeders so that bus services can reach areas that are not served by public transportation. And also, the ease of transactions in the form of cards for users. However, in its implementation, the concept of smart mobility still has shortcomings in its implementation. This paper will discuss the standards used in the stages of developing smart mobility in Jakarta, so that the work carried out will have good references and the results obtained will certainly be more effective and efficient. The standard used is ISO 37210, which can identify systems in managing governance tools, presenting transparent achievements, or real-time applications. With the ISO 37120 standard, it is hoped that all aspects can run well.*

Keywords: City, Jakarta, smart city, smart mobility, standars, ISO 37120

Channel Bonding Comparison Analysis with Channel Aggregation on Multiple Gigabit Wireless Systems (MGWS) with IEEE 802.11 ad Standard

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Abstract. *Multiple Gigabit Wireless System (MGWS) technology is a radio communication network that can be used for short-distance communication, Line of Sight (LoS) and Non-LoS with WLAN topology that uses an unlicensed frequency band of 60 GHz. MGWS is known by ITU-R M.2003-2 standard, while WiGig is also known as IEEE 802.11ad standard. The recent upgrade, dubbed the IEEE 802.11ay provide faster and longerrange wireless transmissions. This change to the IEEE 802.11 ad standard defines standard modifications for IEEE 802.11 physical layers (PHY) and medium access control layers (MAC). In this journal discussed the analysis of channel bonding on Multiple Gigabit Wireless System (MGWS) with the method used is to compare the effectiveness of channel bonding with channel aggregation. From the results of the analysis, channel bonding is more appropriately chosen for the application of communication in this MGWS technology, because channel bonding has a greater throughput of 10% of channel aggregation.*

Keywords: Channel bonding, Channel aggregation, IEEE 802.11ayMGWS, WiGig, WLAN.

Cybersecurity Capability Maturity Model Enhancement to Deal with Cyberattack in COVID-19 Pandemic

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Abstract. *Indonesia is a country with the fourth largest population and internet users in the world, making the possibility of cyberattacks even greater, especially with the current condition of the world still in the condition of COVID-19. Therefore, in considering many potentials cyberattacks that can occur, companies must have a deep understanding of the security quality of assets owned by the company. This study discusses the development of a conceptual model of a cybersecurity maturity model that is widely used by companies to measure the extent of cybersecurity maturity to company assets, namely the Cybersecurity Capability Maturity Model (C2M2). We adapted 10 domains of C2M2 developed by the United States Department of Energy (DoE) in 2014 and added 2 more domains, namely Data Protection (PR) and Data Recovery (RE).*

Keywords: cybersecurity capability maturity model, C2M2, cybersecurity, cyberattack, COVID-19

Evaluation of Depok Single Window Application to Support Smart City: Value based Adoption Model (VAM) Approach

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Abstract. *Depok City is one of the cities that was specifically chosen to implement the Smart City concept. Depok Single Windows (DSW) as an application made of Depok city government in 2018, has an important role in integrating all websites related to Depok city. Currently, the DSW application is entering the evaluation stage, in which user experience is needed to analyze information and users' needs so that it can be adapted into DSW. and it will affect the number of users and their rating. This study aims to examine the factors that increase people's intention to use the DSW application. It used the Value Based Adoption Model (VAM) approach and employed the Partial Least Square - Structural Equation Model (PLS-SEM) method. Data collection was carried out by distributing online surveys. It was found that technicality and risk factors had a negative effect on users' intention to adopt the DSW application.*

Keywords: Depok Single Windows (DSW), Smart City, Application Evaluation, VAM.

Unsupervised Machine Learning for Topic-Based Clustering on Japanese Short Answer

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Abstract. *The clustering algorithm has been used for topic modeling in natural language processing. This research will compare the precision and recall of two clustering algorithms: K-means clustering and hierarchical agglomerative clustering (HAC) in clustering the Japanese short answers. A total of 215 answers from 5 questions will be clustered into 6 groups based on the topics with one of the clusters is expected to be a cluster for the empty answer. The use of Romanization makes more answers can be correctly clustered. Between the two clustering algorithms, K-means clustering with Romanization shows a total of 205 of 215 in the expected cluster, resulting in 96.5% precision and 96% recall while HAC has 95% precision and 93.7% recall at most.*

Keywords: Hierarchical Clustering, K-Means Clustering, Machine Learning, Natural Language Processing, Term Frequency – Inverse Document Frequency (TF-IDF)

Viral and Bacterial Pneumonia Classification from X-ray Images Using Deep Convolutional Neural Networks

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Abstract. *Pneumonia is a disease that can occur in the lungs caused by a viral infection or bacterial infection. In general, the disease can be diagnosed from chest X-ray images by the expert, but due to its appearance in the images, it can be seen as unclear or confused with other diseases. Moreover, the difference between both viral and bacterial pneumonia is hard to distinguish whereas both infections have different treatment from each other. In this study, we used simple CNN, InceptionResNetV2, and DenseNet201 to classify between normal lung, viral pneumonia, and bacterial pneumonia. Simple CNN weights are trained in all layers whereas InceptionResNetV2 and DenseNet201 used transfer learning and fine-tuning for training. The best result is achieved by DenseNet201 architecture with L2 regularization of 0.1. The resulted accuracy and F1 score produced from that model using test set are 93.00 and 93.11, respectively.*

Keywords: deep learning, InceptionResNetV2, DenseNet201, fine-tuning, pneumonia, image classification

Anomaly Intrusion Detection System Based On Homogeneous Ensemble Learning with Oversampling and Feature Selection

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Abstract. *The risk of cyberattacks is directly proportional to the growth of applications and computer networks. The Intrusion Detection System (IDS) detects anomalies in network traffic to reduce this risk. A machine learning approach is needed related to this. The development and utilization of IDS with machine learning have been applied in several studies. Choosing the right machine learning approach is needed to improve cyberattack detection. In this study, we used a homogeneous ensemble learning method that optimizes the tree algorithm. The Communications Security Establishment and Canadian Institute of Cybersecurity 2018 (CSE-CIC-IDS 2018) dataset were used to evaluate the proposed approach. The Polynom-fit SMOTE (Synthetic Minority Oversampling Technique) method was used to resolve the imbalanced dataset problem. 23 feature subset results from the application of feature selection on the dataset were used to evaluate the model. The proposed model achieved 99% accuracy; 99,2% precision, 97,1% recall; and 98,1% F1-score.*

Keywords: intrusion detection system, oversampling, feature selection, homogeneous ensemble learning, CSE-CIC-IDS 2018

Telemedicine-Based Monitoring System for Vital Health Parameters of Human Body Based on IoT Platform

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Abstract. *Oxygen saturation levels, heart rate, hemoglobin, and body temperature are vital signs of human health that can indicate that a person is in good health or sick. Checking vital signs is done by going directly to a health facility. However, the government recommends not to visit hospitals during the Covid-19 pandemic because hospitals are the highest cluster of Covid-19 virus spread. In addition, currently there is only a health service platform for teleconsultation, where doctors cannot know the patient's vital condition when conducting health consultations remotely. In this study, a hardware system that is integrated in real-time into a mobile application using a cloud server is implemented as a renewal of telemedicine technology in providing remote health services. The test of the 2 blocks got good results with an accuracy of 99.346% of oxygen saturation sensor readings, 97.9059% of hemoglobin, 96.759% of heart rate and 96.54% of body temperature.*

Keywords: Vital Parameters, Telemedicine, IoT

Abstract List

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Metallurgy Materials 1

Evaluation of Mixing Purple Sweet Potato and Turmeric Extract as Green Corrosion Inhibitor for API-5L Steel Pipe in 3.5% NaCl Environment

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Abstract. *Corrosion inhibition properties of green inhibitor from extract purple sweet potato (Ipomoea batatas L) mixed with turmeric (Curcuma longa L) for API 5L steel in 3.5% NaCl environment was research using potentiodynamic polarization and electrochemical impedance spectroscopy. The result show the highest efficiency inhibition of 82.54% was obtained for the concentration of 16 ml turmeric extract + 2 ml purple sweet potato extract. Potentiodynamic and EIS studies reveal that the mixture of purple sweet potato extract and turmeric extract act as mixed type inhibitor and was found to obey Langmuir isotherm, respectively. Therefore, curcumin from turmeric and anthocyanin from purple sweet potato are good as an alternative eco-friendly inhibitors.*

Keywords: purple sweet potato extract, turmeric extract, green inhibitor, polarization measurement, EIS measurement.

Localized Loss Thickness at Weld Joint Elbow Pipe Caused Microbial Induced Corrosion (MIC) at Gas Processing Plant

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Abstract. *An investigation of failed Elbow 2" line at Gas Processing Plant System. Form of failure were thinning due to corrosion. Elbow 2" line transferred crude oil from close drain pump to Low Pressure (LP Separator) pressure vessel. There was SRB issue at this line and irregular number of biocides injected into this line. Visual examination showed irregular root weld penetration and white rust along the leakage pipe. Visual analysis indicate leak (pit) propagated from the weldment and penetrates into HAZ and excessive root penetration area. Microstructure analysis Acicular ferrite was showed at the weld area. Chemical composition of tubes checked by Optical Emission Spectrometer P, S, Mo and V below the material specification. Mechanical properties minimum strength required for ASTM A106 Gr. B was 415 MPa. Tubercle showed under Scanning Electron Microscope and EDX analysis. EDX examination results are the white scale has high sulfur content and carbon content, Lamellar structure at the white scale has high content of sulfur and carbon, High percentage of oxygen and Iron at the other location indicate the product of general corrosion. SEM examination shows microbial activities, indicated by the presence of tubercle, several pits were covered by white scale and has lamellar structure. From scale analysis result, the white scale consists of high Sulfur and iron contents indicated of FeS product. No calcite and siderite found at all of the section of the pipe. Absences of calcite and siderite indicate CO_2 corrosion has not happened. Based on flow analysis, area near from tee joint and weldment have different (gradient) velocity. That gradient velocity could occur due to complex design at the pipe such irregular root weld and tee joint pipe. Low velocity at these areas could act as preferential site for MIC's growth and make colonies. This corrosion area has confirmed by ultrasonic thickness. Elbow 2" discharge line had ideal condition for the micro bacterial's growth and make colonies (Sulfate Reducing Bacteria). It has low velocity, low pressure, ambient temperature operation and water content is need for MIC to grow. All of laboratory data and service condition make Microbial Induced Corrosion (MIC) has significant impact at this leakage.*

Keywords: Corrosion; Weldment; Pipe failure; Sulfate Reducing Bacteria; Microbial Induced Corrosion.

Potential Utilization of Red Mud as Waste Processing Bauxite into Alumina in Indonesia

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Abstract. *Red mud is a solid waste that contains a lot of Iron Oxide produced from industrial production of alumina (aluminium oxide is main raw material used in the manufacture of aluminium metal, ceramics, abrasives, and refractories). Red mud is a waste that contains iron in the form of; Hematite (Fe_2O_3), Aluminium Oxide (Al_2O_3), Silica (SiO_2), Titanium Dioxide (TiO_2), and others. More than 95% of the amount of alumina produced globally, is processed by the Bayer process, therefore, for every ton of alumina produced, about 1 to 1.5 tons of red mud are produced. In 2020, it was recorded that there were around 130 million tons of alumina produced, as a result which more than 160 million tons of red mud waster were also produced. In this study, the red mud will be dried, crushed into fine granules which will be characterized using SEM, XRF, Pycnometer, Thermal Analysis, and Blaine test. After being tested, results show that Fe and AI are the most dominant elements. The Blaine and Pycnometer test also showed that the grain size of the red mud was smaller and finer, when compared to another fine aggregate in general. Mass changes occur at temperatures of 100℃, 320℃, and 650℃ in the Thermal analysis test, although the value was not too significant.*

Keywords: Red Mud, Aluminium, Alumina, SEM, XRF, Thermal Analysis.

Evaluation control of corrosion on carbon steel pipe with chemical cleaning and passivation in a hot-rolled steel plant cooling water system using polarizations

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Abstract. *Corrosion can cause problem on carbon steel pipes in the cooling water system when the system is off-line. In this paper, chemical cleaning & passivation procedure on control of this problem was extensively studied during pre-commissioning. The results showed that citric acid and EDTA as chemicals cleaning effectively remove iron oxide. At the same time, inhibitors of poly- and ortho-phosphate are maintained along with zinc develop a passivating film on the metal surface. Corrator monitoring showed that the average corrosion rate of 2,34 mpy was obtained after passivation. Polarizations studies supports the increase in surface coverage of the metal surface by the inhibitor, forming a protective film. Further verification comes from the surface characterization of the inhibited metal surface by SEM and EDS spectrum revealed O, P, Zn, and Ca, beside Fe peaks.*

Keywords: Carbon steel pipe, chemical cleaning & passivation, corrator, cyclic potensiodynamic, EIS, SEM, EDS

Electrochemical behaviour of Al-5Zn-2Mg with copper and lanthanum as micro-alloying elements for low-driving voltage sacrificial anode

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Abstract. *To prevent the formation of a continuous and stable passive layer of γ-Al_2O_3, an active surface with minimum polarizable and self-corrosion is required for aluminum alloy sacrificial anode to perform efficiently. A low driving voltage sacrificial anode is an additional attribute to avoid the danger of hydrogen-induced damage on a high-strength steel structure. Combining activator and voltage controller elements is essential to reduce its electronegativity. Grain refiner element(s) is a supplementary solution to reduce self-corrosion. In this scrutiny, each Cu and La was added to Al-5Zn-2Mg alloy and characterized using CPP, optical microscopy, and SEM to elucidate the influence of each element on the electrochemical activities in 3.5% NaCl. Increasing number and size of precipitates and electronegativity reduction by 72mV were observed along with an additional 1%wt Cu. Additional 0,1%wt La gives a high number of precipitates and corrosion rate; however, the following concentration reduced size, number of precipitates, and corrosion rate.*

Keywords: Low driving voltage, aluminum alloy, sacrificial anode, copper, lanthanum, CPP, SEM

Effect of Lanthanum on Microstructure and Corrosion Behavior of Al-Zn-Sn as a Low Voltage Sacrificial Anode for Marine Environment

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Abstract. *One of the most studied sacrificial anodes is the Al-Zn-Sn alloy, which has a current efficiency of about 70%. To increase the efficiency of aluminium alloy sacrificial anodes, rare earth metals such as lanthanum are often added. From several studies, the addition of rare earth metals shows different effects, from increasing current efficiency until sealing effect on passive layer. Therefore, further research is needed on the effects on microstructure and corrosion properties of adding lanthanum to one of the frequently used aluminium alloys, such as Al-Zn-Sn. The variations of the test samples were Al-Zn-0.5Sn-xLa and Al-Zn-1Sn-xLa (x= 0.1, 0.3, 0.5). The samples were tested for SEM-EDS and cyclic polarization Lanthanum was distributed in Al matrix and precipitate by forming an intermetallic compound. From the cyclic polarization result, potential of pitting corrosion was shown decreasing as the lanthanum content increased.*

Keywords: sacrificial anode, rare earth element, lanthanum

The Effect of Lanthanum Addition on Corrosion Behavior and Microstructure of Low Voltage Sacrificial Anode Al-Zn-Cu Alloy

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Abstract. *Specimen Al-5Zn-0.5Cu-xLa and Al-5Zn-1Cu-xLa (x = 0.1; 0.3; 0.5 wt%) were made as low voltage sacrificial anode candidates. The electrochemical properties and corrosion behavior were analyzed by conducting Cyclic Potentiodynamic Polarization (CPP). Meanwhile, the microstructure was analyzed by conducting Optical Microscopy (OM). It is found that the lanthanum addition gives massive drop in corrosion rate. The highest corrosion rate is 0.05697 mm/year at Al-5Zn-1Cu-0.1La and the lowest corrosion rate is 0.0025 mm/year at Al-5Zn-0.5Cu-0.5La. The lanthanum addition also increases the hysteresis loop size which indicates more tendency in pitting corrosion. Lanthanum formed precipitates at grain boundaries which caused segregation phase and made SDAS to be shorter, with shortest SDAS is 27.82051 µm at Al-5Zn-1Cu-0.5La.*

Keywords: sacrificial anode, aluminium alloy, rare earth element, lanthanum, corrosion behavior, microstructure.

Failure Analysis Coating Degradation on Corrosion Under Pipe Support (CUPS) by Using Visual and Metalography Examination

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Abstract. *Failure analysis coating degradation on corrosion under pipe support by using visual and metallography examination has been conducted. Failure analysis consist of visual inspection, chemical analysis of CUPS pipe steel A 106, X-ray diffraction examination corrosion product, optical characterization of surface morphology the specimen and corrosion testing. Visual inspection showed that the surface of CUPS underwent severe corrosion due to coating degradation. Chemical analysis of CUPS by ICPMS showed that the CUPS was pipe steel A 106. X-ray diffraction examination corrosion product depicted that the main corrosion was dominated by FrCr2O4 and FeOOH and Fe2O3 is minor oxide. Metalography examination depicted that the microstructure of steel A 106 connsist of pearlite and ferrite. Corrosion testing is used to evaluation corrosion rate of specimen in simulated sea water. The results show that the corrosion is good with corrosion rate of 12 MPY. It can be concluded that the corrosion of CUPS taken place due to coating degradation.*

Keywords: Coating Degradation, CUPS, A 106, Pearlite

The Effect of Rare Earth Yttrium as Alloying Element to Corrosion Behaviour of Al-Zn-Cu Sacrificial Anode

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Abstract. *Sacrificial Anode is one of the cathodic protection systems used to protect the material from corrosion attack. Previous studies with Al-5Zn-Cu showed that this alloy is capable of being a candidate for sacrificial anode due to its high corrosion rate. The effect of the rare earth element Yttrium on Al-5Zn-0,5Cu and Al-5Zn-1Cu alloys was investigated by observing the microstructure using an optical microscope and cyclic potentiodynamic polarization. Yttrium used as variables were 0.1wt%, 0.3wt%, and 0.5wt%. Microstructural observations were carried out to see changes in the size of the SDAS and the formation of precipitates. Cyclic polarization was carried out to determine the corrosion behavior of the sacrificial anodes Al-5Zn-0,5Cu-xY and Al-5Zn-1Cu-xY. The effect of Yttrium can form precipitates at grain boundaries and reduce the size of SDAS. Based on the results of cyclic polarization, it shows that the corrosion rate decreases but the highest alloy Al-5Zn-1Cu indicates that the hysteris loop has the largest area, this factor is still dominated by the high element of Cu. The rare earth Yttirum 0.1wt%, 0.3wt%, and 0.5wt% variations has the potential as a grain refinement in Al-Zn-Cu but cannot be used as a candidate for additional elements in the low voltage sacrificial anode. ".*

Keywords: Sacrificial Anode, Aluminium Alloy, Rare earth, Yttrium, Corrosion

RISK ASSESSMENT ON RISER AT OFFSHORE FACILTIES

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Abstract. *Risk assessment for offshore facilities are a key component in order to maintain the integrity and reliability of the subsea transmission pipeline and to ensure product distribution is always compliant with safety standards and to ensure quality and quantity of volume is according to design. An assessment is needed to provide status and plans of risk, inspection, monitoring and integrity assessment on the Riser as well as the mitigation as a continuous system. Therefore, this paper presents risk based on probability of failure (PoF) and consequence of failure (CoF) estimation. PoF estimation is conducted qualitatively with scoring method 3 main components in PoF scoring which are third party damage, inspection results and design & operation. CoF is divided into multiple levels of consequence for each consequence group (i.e. personnel safety, threat to asset, environment and reputation & regulation). Inspection frequency also define by depends on Risk level, Risk assessment input data validity, Confidence level in integrity status, and Evaluation of potential risk expansion.*

Keywords: Risk Based Inspection, Probability of Failure, Consequence of Failure, Risk Assessment

Model Risk Analysis for Critical Buried Onshore Crude Oil Pipeline

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Abstract. *Instead of technical life of pipe, the failure of pipeline system is caused by the specific content of the passing crude oil. The risk management system is designed to estimate the risk level for next five years. A 20" onshore crude oil pipeline was buried and exposed to soil and river water. Some threat related to underground condition were identified such as soil corrosion and external surface corrosion of pipeline. Risk level was assesed by calculating the value of PoF and CoF using methodology complies with the developed RBI for onshore pipeline sections. Calculations were conducted using PEPRiskA software which results PoF, CoF, risk level, integrity status, and expected loss to provide recommendations for time dependent failure prevention. Based on RBI analysis result, characteristic of inspection (schedule, method and effectivity level) was obtained. Four years interval inspection should be conducted with amount range of inspection segment between 800 to 1500 segments.*

Keywords: Oil Pipeline; external corrosion; risk assessment

The Effect of Addition of Yttrium on Corrosion Behavior of Sacrificial Anode Al-Zn-Sn

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Abstract. *Sacrificial anode is a type of corrosion protection in which less noble metal is connected by a conductor to the structure meant to be protected. The focus of this research is aluminum based sacrificial anode alloyed with Zn and Sn. In addition to the Zn and Sn, another alloy added is Yttrium (Y). Y is one of the rare earth elements that has the potential as a grain refiner and makes the structure homogeneous that can increase the efficiency of the sacrificial anode. The research process includes observing the microstructure with Scanning Electron Microscopy-Energy Dispersive Xray Spectroscopy (SEM-EDS), Open Circuit Potential (OCP) and Cyclic Potentiodynamic Polarization (CPP) to determine corrosion behaviour. Precipitate contains Sn as the most element. Sample Al-5Zn-0.5Sn-0.3Y is an alloy that has the greatest potential for pitting corrosion.*

Keywords: sacrificial anode, aluminium alloy, Al-Zn-Sn, rare earth element, yttrium, corrosion

Synthesis and Characterization of LBMO Materials with Fe and Ti Doping as Wave Absorber Materials

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Abstract. *Lanthanum manganese-based perovskites have been the subject of many studies to this day. In this paper, we synthesize $La_{0.7}Ba_{0.3}MnO_3$ (LBMO) and substitute La and Mn ions with other ions. The substitution of the Ba ion at the La site results in the absorber property of electromagnetic waves. Furthermore, at the Mn site, Fe and Ti doping variations were added to the LBMO to form a new compound of $La_{0.7}Ba_{0.3}Mn_{0.85}X_{0.15}O3$ (x = Fe, Ti and the parent compound LBMO). The synthesis of LBMO using the sol-gel method resulted in a single phase compound with Space Group R-3c and a rombohedral crystal structure. The presence of Fe or Ti substitution in LBMO causes a difference. Ti substitution causes an increase in cell volume. The combination of doping resulted in an increased LBMO absorbance value. The test results show that the substitution of Fe produces the largest wave absorption value. We investigated the correlation changes in doping variation and changes in wave absorption values.*

Keywords: LBMO, Sol-Gel, Crystal Structure, and Electromagnetic Wave Absorber

Abstract List

The 6th

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Metallurgy Materials 2

Characteristic of Al 7075 reinforced nano SiC composites as an armour material produced by squeeze casting process

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Abstract. *Armour material is widely used in the military field to protect the lives of soldiers and is used in vehicles such as tanks. Tanks generally use armour from steel but have a weakness in mobility due to their weight. Aluminium alloy 7075 is lighter than steel that can be used as a composites matrix reinforced with nano SiC produced by squeeze casting method. In this study, the composites made were characterised for both ballistics, microstructural analysis, and mechanical testing. The results of the ballistic test on the sample are not ballistic resistance in type III NIJ but ballistic resistance with type II NIJ in samples with composition above 0.2% SiC. The microstructure of composites was observed reduced in grain size until 0.2% SiC due to the pinning effect. The mechanical testing result is increasing in impact value but hardness value decreases at 0.3% SiC.*

Keywords:Armour, Tanks, Aluminium Alloy 7075, Ballistics, Microstructural, Mechanical

Effect of Repeated TIG Welding Cycles on Appearance of Intermetallic Phases of UNS 32760 Super Duplex Stainless Steel

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Abstract. *Microstructure examination of repeated TIG welding cycles of UNS32760 super duplex stainless steel was conducted through a scanning electron microscope (SEM) and energy dispersive x-ray spectroscopy (EDS). The specimens were evaluated to simulate repeated welding cycles of original weld, Repair-1 (R_1), Repair-2 (R_2) and Repair-3 (R_3) respectively. The result shows that the nitride precipitates (CrN, Cr_2N), the carbide precipitates (M_7C_3, $M_{23}C_6$) and the oxide precipitates (Cr_2O_3 and $(Cr, Fe)_2O_3$) start appearing in the heat-affected zone and both the R_2 and R_3 welding cycles.*

Keywords: Super duplex, Repeated Welding Cycles, Intermetallic Phases

Morphological and mechanical properties of sepiolite/thermoplastic nanocomposites : A short review

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Abstract. *Nanocomposites are materials consisting of a polymeric host incorporated with nanoscale particles (1-100nm). By incorporating small particle size clay such as sepiolite into a polymer matrix, polymer clay nanocomposites (PCN) are formed. Sepiolite has been embedded majorly into thermoplastics such as polyethylene (PE), thermoplastic polyurethane (TPU), polymethyl methacrylate (PMMA), poly (vinyl alcohol), (PVA), polypropylene (PP), poly (lactic acid), and other polyester families. Sepiolite is an inorganic clay and a fibrous filler. It has been promoted as a possible replacement for other inorganic clays such as hectorite, montmorillonite (MMT), etc. as a reinforcing filler, majorly due to its higher absorption and adsorption capability. In view of these attributes, this review described the sepiolite structure-properties relationship. Focusing on conventional preparation approaches, morphological and mechanical properties. Modern preparation techniques have been proposed for sepiolite/thermoplastic nanocomposites.*

Keywords: sepiolite, morphology, mechanical properties, thermoplastics, nanocomposites

Failure Analysis of Tube Welding Joint in Pressure Safety Valve Instrumentation System

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Abstract. *In industrial equipment installation, tubes are widely used as fluid transmission channels in a series of instrumentation systems in determining the appropriate operational conditions. The use of tubes as part of instrumentation systems is generally connected to the equipment using threaded fittings or welding processes. In this case, failure was found at the joint between instrumentation tubing and pipe fitting in the form of a fracture at the weldment area. The main cause based on observations was pursued to prevent repeated occurrences.*

Keywords: failure analysis, welding joint, small diameter tube, fatigue crack, and vibration.

Influence of filler metal TGX ER2209 and ER 2594 for Root Pass on Microstructure, Mechanical properties and Corrosion Resistance in Welding of Material Duplex ASTM A928 UNS S31803

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Abstract. *Welding of material duplex ASTM A928 UNS S31803 very commons in the industrial sector of petrochemical, oil & gas and power plan. Mostly they use GTAW (Gas Tungsten Arc Welding) as welding process for root pass. Purging gas or backing gas is very importance to avoid oxidation on the root pass. The main purpose to avoid oxidation is related with corrosion resistance. On this welding material duplex ASTM A928 UNS S31803, we can use filler metal ER 2594. In other side purging gas especially for duplex is not economical for long spool pipe. Another option to weld material Duplex use GTAW welding process without purging gas is use filler metal TGX ER2209. The result of mechanical properties and microstructure between filler metal ER 2594 and TGX ER2209 is mostly same. Result of Ultimate Tensile Strength is 753 N/mm^2 lowest value for specimen without purging gas and 779 N/mm^2 lowest value for specimen with purging gas. The lowest average value for impact test for both specimens are in the notch location of fusion line which tested at temperature -46^{0}C with value 72 Joule for specimen with purging test and 75 Joule for specimen without purging gas. The highest value for hardness test for both specimens are in Heat Affected Zone with value 307 HV10 for specimen with purging gas and 289 HV10 for specimen without purging gas. Ferrite content for specimen without purging gas are 36 – 49 % and specimen purging gas are 44 – 49 %. Corrosion resistance which tested refer to ASTM G48 Method A to find out the loss weigh of both specimens with immerge on the ferric chloride test solution with test period 24 hours, found that both specimens didn't have any change in the weight. These result showing that both filler metal is similar and can be used.*

Keywords: Duplex ASTM A928 UNS S31803, TGX ER2209, ER 2594, purging gas, GTAW

The Effect of surface roughness on Microstructure and mechanical properties in Copper rod, Aluminium rod, and Aluminium Alloy rod joined by Upset Butt welding

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Abstract. *Upset butt welding is mostly used in metal industry that produces metal rods which needs to be joined to next roll of material. In the present research, upset butt welding of copper rod, Aluminium rod and Aluminium Alloy rod were investigated the effect of surface roughness on microstructure and tensile strength of welded area. Microstructural test of welded copper rod show that different grain size in microstructural zones. The grain size increases with the finer sample surface. Its also considerable influence on tensile strength. Microstructural test of welded Aluminium rod show that no difference found microstructural zones. This proves that Aluminium rod is perfectly joined by upset butt welding. Microstructural test of welded Aluminium Alloy rod, there wasn't different microstructural zones from #300 and #600 surface roughness. However, the results of the 1000# surface roughness show welding defects. Mechanical properties Aluminium and Aluminium Alloy sample decrease with finer sample surface.*

Keywords: Upset butt welding, survace roughness, Microstructure, tensile strength.

Effect of Addition Acetic Anhydride on Unsaturated Polyester /Vinyl Ester Blends on Mechanical Properties and Water Resistance for A36 Steel Coating Application

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Abstract. *Unsaturated polyester (UP) was blend with 40 wt. % vinyl ester (VE). The unsaturated polyester (UP)/vinyl ester (VE) was mixed with acetic anhydride (Ac2O). Acetic anhydride composition was 0 ; 2.5 ; 5 and 7,5 wt. %. Acetic anhydride was role as coupling agent to increase the interaction and cross link density between UP and VE. The blend was prepared using mechanical stirrer at 50 rpm The mixture was then cured at room temperature using 2 wt. % methyl ethyl ketone peroxide (MEKP) as a catalyst. The polymer blend were characterized by testing tensile test, lap shear test, hardness test and immersion test. The addition of Ac2O as a coupling agent increased the mechanical strength and water resistance.*

Keywords: mechanical properties, acetic anhydride, unsaturated polyester, vinyl ester, water resistance

Absorption Coefficient Analysis For Thermal Neutron From Ultra High Molecular Polymer Polyethylene Weight (UHMWPE) With H_3BO_3

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Abstract. *Radiation shield is a physical barrier placed between a radioactive ionizing source and the object or target to be protected to reduce radiation levels. Ultra High Molecular Weight Polyethylene (UHMWPE) contains 14% elemental hydrogen, so it can absorb and slow down neutron radiation energy. The addition of boric acid filler (H_3BO_3) in this study aims to increase radiation absorption with variations of 5%, 10%, and 15% respectively using the blending method with a temperature of 170^oC and a time of 15 minutes. The neutron radiography method in this study used a neutron source from RSG-GAS. Neutron boards are used for the neutron thermal absorption test process. The results of the study concluded that the mixture of UHMWPE with 5% H_3BO_3 filler had a lower neutron absorption intensity than UHMWPE with 15% H_3BO_3 filler, value of μ is 0,152 and 56% neutron absorption percentage.*

Keywords: Ultra High Molecular Weight Polyethylene (UHMWPE), Radiation shielding, boric acid (H_3BO_3)

Birackle (Bioleaching for Recycle Nickel) Nickel Bioleaching from Ni-Cd Battery Waste as A Solution for Utilizing B3 Waste into Energy Source

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Abstract. *Nickel-cadmium batteries have an important role in the development of energy storage systems. According to the report prepared by the State Environmental Protection Administration of China (SEPA), the quantity of dry batteries produced and consumed has increased rapidly in recent years in China. Peak values were reached in 1998: 14.1 billion batteries were produced and 8.37 billion batteries were consumed (SEPA, 2000). It is estimated that 3.88% of discarded dry batteries are nickel–cadmium batteries. Nickel–cadmium batteries are classified as hazardous waste because nickel and cadmium are heavy metals and suspected carcinogens (Shapek, 1995). The efforts to recycle rechargeable batteries are needed to reuse nickel-cadmium battery waste so as not to pollute the environment. Therefore, the author has an idea to recycle nickel-cadmium batteries using the bioleaching method. Bioleaching is a method for extracting metals using Acidithiobacillus ferrooxidans. The methodology used in this research is a literacy study on the concept of bioleaching, and the nickel-cadmium battery recycling process. This research is expected to be a solution to utilize used nickel-cadmium battery waste as a source of nickel for renewable energy needs that can be used at any time so as to facilitate human activities and reduce environmental pollution.*

Keywords: bioleaching, Ni-Cd battery, recycle, waste

CHARACTERISTICS OF MARSHALL IN A MIXTURE OF THIN LAYERS OF ASPHALT CONCRETE WITH NATURAL RUBBER SIR 20 AS AN ADDITION.

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Abstract. *The surface layer of the road pavement serves to carry and spread the traffic load for providing comfort to road users during its service period. However, damage to the pavement layer often occurs before the service life ends. Therefore, innovation and technology development are needed to solve these problems. The addition of SIR 20 natural rubber in Thin Layers of Asphalt Concrete (AC-TL) mixture on the surface layer of highway pavement structure is expected to solve the damage. Natural rubber is added into this asphalt mixture with the rubber percentage variation of 0%, 6%, 8% and 10% to the asphalt weight. This study result showed that the addition of SIR 20 in the AC-TL mixture increased the value of Marshall characteristics such as stability value, void in mineral aggregate, void in mixture, marshall quotient, and the optimum bitument content for each level of addition of rubber in the mixture.*

Keywords: Rubber asphalt, SIR 20, natural rubber, marshall characteristics, Thin Layer Asphalt Concrete (AC-TL)

Utilizing the Potential of Polymer Material within Wasted Tailings as a Way to Reinforce Structural Integrity of Polymer Concrete

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Abstract. *The mining sector in Papua has continued to produce unsustainable tailings that have contaminated the ecosystem within the Ajkwa River, which serves as a traditional sanitation area and a food source for the locals. A single mining industry there can produce up to 223.100 tons of waste tailings per day, with the major elements of tailings containing 58 percent SiO2 and 7.92 percent Al2O3, a mineral that can be used to substitute pumice. With the use of this waste material as the component of the Concrete Polymer, better compressive strength can be achieved due to more concentration of SiO2, hence creating an advantage of not only strengthening structures as a long-term form of national investment and human development in Papua but also as a solution in reducing water pollution that can endanger public health of the locals.*

Keywords: Tailings, Mineral Waste, Polymer Concrete, Compressive Strength, Sustainability

Analysis Cyclic Voltammetry Copper in Deep Eutectic Solvents for Recovery Copper from Printed Circuit Boards (PCBs) Waste Using Electrodeposition Process from Leaching Solution.

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Abstract. *Waste Electrical and Electronic (WEEE) become environmental problem. WEEE every year always increase but quantity recycling of the WEEE still small. WEEE has good potential as secondary metal source because high purity and low energy to recovery. Printed Circuit Boards is the one of WEEE which contain metal. Major metal in Printed Circuits Boards is Copper. In this research, to recovery copper from PCBs using process Electrodeposition, after leaching using Iodine as oxidator agent and Deep Eutectic Solvents as electrolyte. 3 types HDB were used in this research. Cyclic Voltammetry was used to know the electrochemical potential windows and reduction potential copper in Deep Eutectic Solvents. All of types Deep Eutectic Solvents has potential windows between -1V until 1V and reduction potential copper is -0.7V & -1.0V. Depostion occurred ChCl- Ethylene Glycol 4.2% and copper purity 99%.*

Keywords: Deep Eutectic Solvents, WEEE, e-waste, electrical waste, Cyclic Voltammetry, Copper

Iodine Doping On $Li_4Ti_5O_{12}$ Anode With Simple Milling Method To Increased Electrochemical Performance Lithium-Ion Battery

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Abstract. *New generation for lithium ion battery anode was lithium titanate oxide ($Li_4Ti_5O_{12}$). $Li_4Ti_5O_{12}$ has been succesfully synthesized using solid state method by adding the variation of lithium iodine (x = 0.1, 0.15 and 0.2 moles). $Li_4Ti_5O_{12-x}$ I_x exhibits higher specific discharge capacity, excellent cycling performance and better rate capability compared with pure $Li_4Ti_5O_{12}$. The highest specific discharge capacity of 187.11 mAh/g at 0.5 C shown by $Li_4Ti_5O_{12-x}$ I_x (x = 0.2). $Li_4Ti_5O_{12-x}$ I_x delivered excellent cyclic stability even until 50 cycles. At the different rate, $Li_4Ti_5O_{12-x}$ I_x still have a higher specific capacity until 5C than pure $Li_4Ti_5O_{12}$. The result indicates that $Li_4Ti_5O_{12}$ doping with ion iodine can improved the electrochemical performance lithium ion battery.*

Keywords: lithium ion battery, battery anode, lithium titanate oxide, doping iodine, solid state reaction

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Recycling Solvent Organic Waste of Used Lube Oil by Fractional Distillation Process

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Abstract. *A recycling process was developed for the recovery of solvent. Recycling will help the environment with the impacts of hazardous chemicals such as solvent organic waste. This paper objective was to study the fractional distillation process for recovering solvent organic waste of used lube oil. The key parameters considered are time (510, 90, 60 and 30 minute) and temperature (115°C, 125°C, 135°C, and 145°C). The experimental result of organic solvent purity was analyzed by Fourier Transform Infra Red (FTIR) Spectroscopy. The best result was obtained in distillation temperature 145°C.*

Keywords: FTIR, organic, lube oil, recycling, waste

Introduction

Organic solvents are solvents that generally contain carbon atoms in their molecules. Organic solvents are highly lipophilic, hence able to dissolve oils, fats, resins, rubber, and plastics. An Organic Laboratory in one of engineering faculty was used to to apply organic solvent for cleaning machine of lube oil application. Waste generated from the laboratory was stored in bottles which depend on the type of solvent. Consideration of organic solvent application was ensured that organic solvents may not damage the equipment.

One of hazardous waste was organic solvent waste of used lube oil. The third party handled hazardous waste treatment. Fractional distillation process of organic waste is carried out to separate organic solvent from impurities (used lube oil). Solute depends on its coordination ability and dielectric constant. After testing the viscosity of solvent organic waste, technical grade toluene was applied for flushing capillary tube [1,2]. Organic solvents divided into polar and non-polar in the polarity group of interest. Due to the non-polar nature of the lubricant, the suitable solvent for washing equipment of applied lubricant was organic solvent [3,4]. The selected solvent should have a maximum solubility for used lube oil.

Toluene, also known as methylbenzene or phenylmethane, is a clear, colorless liquid that is insoluble in water with an odor like paint thinner and smells like benzene. Toluene as an aromatic hydrocarbon, is used extensively in industrial feed stocks and also as a solvent. The boiling point of toluene is higher than other organic solvents, hence produce recycle organic solvent. This may reduce the cost of organic solvent and hazardous waste treatment.

The main function of toluene is as an additive to gasoline to increase its octane rating. Toluene is also used to produce benzene and as a solvent in paint, coating, synthetic fragrance, glue, ink, and cleaning agent. Toluene is also used in the production of polymers used to make nylon, plastic soda bottles, and polyurethanes as well as for pharmaceuticals, dyes, cosmetic nail products, and organic chemical synthesis. This paper objective was to study the fractional distillation process for recovering solvent organic waste of used lube oil.

Studies on recycling solvent organic waste have been reported. Several technologies can be used to regenerate solvent materials from hazardous wastes, include fractional distillation, solvent extraction, evaporation, critical fluids processing, air stripping, and carbon adsorption [5]. Distillation provides excellent recovery for the low boiling point compounds [6].

Materials and Methods

Materials

Used lube oil, solvent organic waste, technical grade toluene, toluene pro analysis (toluene p.a), Fourier Transform Infra Red (FTIR) Spectroscopy, fractional distillation apparatus.

Methods

An assembled apparatus used glass beads in the fractionating distillation column. Take the used lube oil and solvent organic waste mixture to be separated in an flask. Some porcelain pieces were added in the flask to avoid bumping. Hence fit the flask with an adapter, attached a fractionating distillation column and put a thermometer. The top of the dry bulb thermometer should be below the side arm of the flask. Hence ensuring the entire thermometer bulb were bathed in the rising vapour as the liquid mixture was heated. Then connected a condenser to the side tube of the adapter. Water circulated from the lower end of the condenser. The flask was heated until the liquid boiled. The heating rate decreased at a constant rate to permit a good separation. The distillate was collected in a receiving flask. The column was insulated to maintain heat by wrapping the column in glass wool followed by an outer layer of aluminum foil. Droplets of liquid should be seen in the fractional column. Avoid flooding, hence the liquid would flow back into the distilling flask. Quality of solvent organic waste after treatment was analysis using Fourier Transform Infra Red (FTIR) Spectroscopy.

Results and Discussion

Effect of Temperature on Distillate Flow Rate

Fractional distillation is employed to separate two or more liquids that are miscible. It is a special type of distillation designed to separate a mixture of two or more liquids that have different boiling points [6,7,8]. The process involves heating the mixture and partial condensation of the vapours along a fractionating column, which is set up such that components with lower boiling points pass through the column and are collected earlier than components with higher boiling points. Repeated vaporization and condensation results in the separation of the components of the mixture. The efficiency of fractional distillation depends on the use of the fractionating column. The fractionating column is packed with glass beads. It provides a large surface area for vaporization and condensation of the liquid mixture.

The process carried out to treat organic solvent waste from viscosity testing is distillation, in addition to reducing the existing waste this alternative can also increase the availability of toluene in the laboratory. In the viscosity test, the toluene used is technical grade toluene because it is only used for flushing capillary tubes, so high purity toluene is not required. Below is a table that shows the relationship between distillation conditions at different temperatures and the resulting distillate discharge:

Table 1. Effect of Temperature on Distillate Flow Rate

Sample	Waste Volume	Temperature	Time (minute)	Distillate Volume	Distilat Rate
A	500 ml	115°C	510	148 ml	0,29 ml/min
B	500 ml	125°C	90	190 ml	2,10 ml/min
C	500 ml	135°C	60	287 ml	4,78 ml/min
D	500 ml	145°C	30	272 ml	9,06 ml/min

Based on the results obtained, it can be seen that the higher the heating temperature in the distillation process, the higher the distillate discharge. This is because the high temperature causes high collisions between the particles so that the substance evaporates more quickly. Low heat temperature has a slow distillate flow rate so that it requires a longer distillation time. If the distillation process lasts a long time, this can lead to the formation of scale on the walls of the boiling flask caused by the characteristics of some components in the form of suspended solids from the heated waste. The crust on the walls of the boiling flask can cause

the heat transfer coefficient to decrease so that the evaporation process is hampered. This makes the heating that is carried out ineffective and efficient since it is held back by the crust that is formed. The distillation process carried out provides a very significant change in waste treatment [9,10]. From black mixture waste turns to a clear distillate in the form of toluene. The best temperature is 145°C which produce highest volume148 ml of distillate.

FTIR Spectroscopy Analysis

The following figure is a fingerprint profile of the waste before distillation when compared to the fingerprint of toluene p.a.:

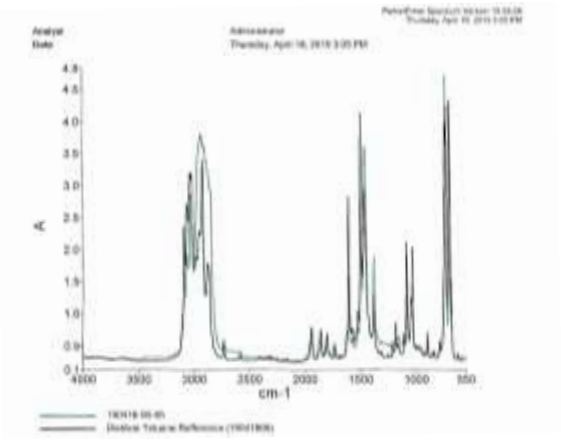
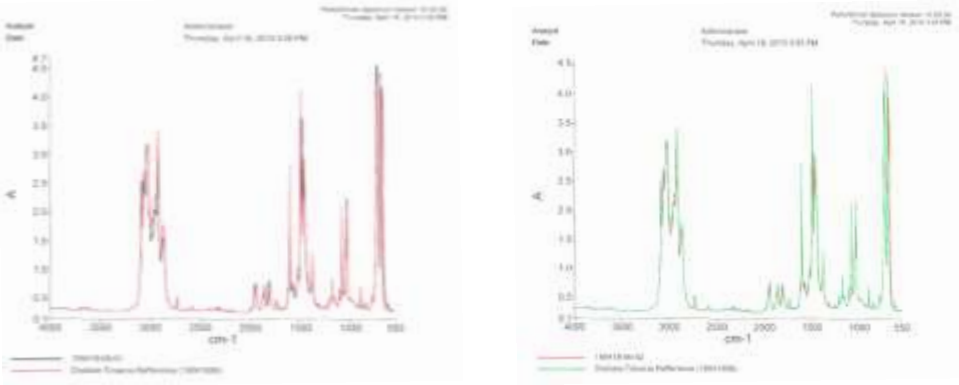


Figure 1. Comparison between Toluene fingerprints p.a. (black) with fingerprint of organic solvent waste (green)

The obtained result was comparison between the fingerprint Toluena p.a. (in black) with fingerprint of organic solvent waste (in green) [11]. The result showed that several peaks were detected, informing the complex structure material. It showed that the highest peak at wavelength 2850-2970 which is an alkane functional group (Alkyl C-H stretch). [12,13,14,15]. After the distillation process, the quality of the resulting distillate was tested by comparing it with toluene p.a sold in the market by the matching method using the FTIR spectroscopy (Figure 2). The following are the results of matching the distillates:



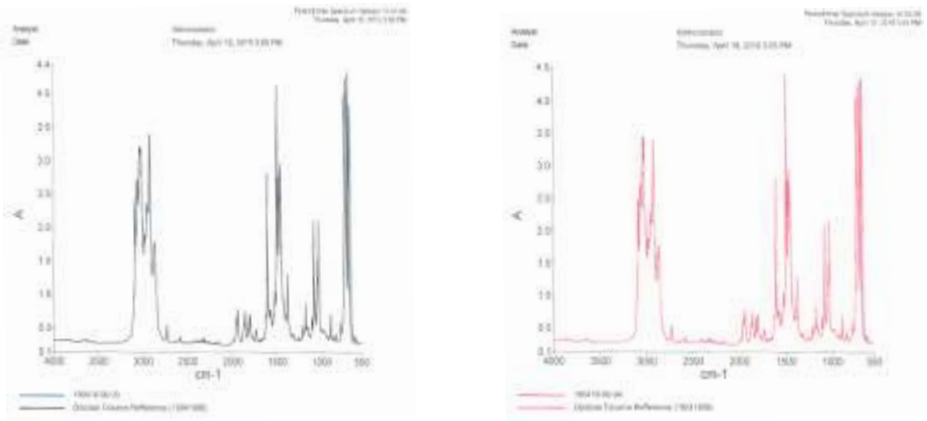


Figure 2. Comparison of Toluene fingerprint with Distillate at 115°C, 125°C, 135°C, 145°C

The results showed toluene fingerprint with distillate at 115°C, 125 °C, 135 °C, and 145 °C had similarity (Figure 2). In the fingerprint region of the typical absorption of toluene, several peaks were detected. For wavelength band 710-764 cm^{-1} indicated toluene as aromatic hydrocarbon [12] which has benzene ring linked to methyl bonding.

Conclusions

Based on the results of the data obtained, concluded that the quality of the distillate increases as the heating temperature increases in the distillation process. The best quality of distillate was obtained in the distillation process at temperature 145°C that produced highest volume 148 ml of distillate. The distillate obtained at temperature 115°C has the same quality as the technical toluene sold in the market, the distillate obtained by conditioning at temperature 125°C has a quality that is between toluene pro analysis. and technical, while the distillate obtained from conditioning at a temperature 135°C and 145°C had the same quality as toluene pro analysis.

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