CITES
Faculty of Engineering
Universitas Andalas

PROGRAM BOOK

THE 1ST CONFERENCE ON INNOVATION IN TECHNOLOGY AND ENGINEERING SCIENCE

Grand Inna Padang Hotel, West Sumatera, Indonesia
November 8th - 9th, 2018

Supported by

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WELCOME MESSAGE

We are very pleased to welcome all of the participants to The 1st Conference on Innovation in Technology and Engineering Science (CITES) held on November 8th -10th, 2018 in Padang, West Sumatera, Indonesia.This meeting is organized by the Faculty of Engineering Universitas Andalas and supported by Universitas Andalas.We believe that this event will never come to happen without your participation and contribution.

This meeting is to bring indonesian scientists, engineers, technical experts, and early-career scientists as well as theirs peers from all around the world to discuss current development and important issues on innovation of technology and engineering science. It is also designed as virtue to exchange knowledges and build strong networks among Indonesian researchers and their International peers.

There are more than 130 scientific talks comprise of 6 plenary lectures. In addition to Indonesian communities, this meeting also attracts International scientists from 3 other countries, which are Malaysia, Singapore and Thailand. There is alsoa collaboration research between Indonesian researchers with UK. The International diversity and the broad spectrum of the participant origins and research fields play an important role of the success of this meeting.

Finally, we wish to express our sincere appreciation to all of the participants for theirs valuable contributions and also to the organizer for their excellent works. We also would like to acknowledge sponsors contribution. Hopefully, you will have a fruitful discussion with your colleagues and enjoy a pleasant stay in Padang.

Prof. Dr. Eng. Gunawarman
Conference Chair

WELCOME MESSAGE

Ladies and Gentlemen,

First of all, I would like to say, welcome to Padang City.

We are really happy that we all can gather in the Conference on Innovation in Technology and Engineering Science (CITES) 2018, in Universitas Andalas.

And, thank you for coming and participating in this conference.

From the bottom of my heart, I say that I highly appreciate all of you, especially. Prof. Dr. Hikita Masayuki, Prof. Dr. David Zhang, Prof. Dr. Andrivo Rusydi, Prof. Dr. Hadi Nur, and others that I cannot mention one by one.

And I say thank Prof. Dr. Tafdil Husni, Rector of Universitas Andalas, who have given me a chance to deliver the speech and participate in the conference.

At last, I really hope we all can collaborate and participate in the conference. And I also hope that CITES 2018 produces good results for our development in innovation, technology and engineering science.

In addition, our cordial relationship, especially in technology and engineering science can continue.

That's it. Let's have a good conference.

Sincerely yours,

Ir. Insannul Kamil, M.Eng, Ph.D, IPM
Dean of Faculty of Engineering, Universitas Andalas

WELCOME MESSAGE

Good morning everyone

Welcome to Padang, the capital city of West Sumatera province. It is such a pleasure to Universitas Andalas for having you all in the Conference on Innovation in Technology and Engineering Science 2018.

Our sincere appreciation goes to Prof. Masayuki Hikita from Kyushu Institute of Technology, Japan. Prof. Dr. David Zhang from the University of Exeter, United Kingdom. Prof. Dr. Andrivo Rusydi from the National University of Singapore. Prof. Dr. Hadi Nur from Universiti Teknologi Malaysia, and last but not least Dr. Insannul Kamil, the Dean of Engineering Faculty of Universitas Andalas for participating at our conference as keynote speakers. We are honored to your participation in this conference.

I appreciate the organizing committee, chaired by Prof. Gunawarman, the scientific committee members, and the international board for their efforts in materializing this conference.

Finally, I encourage delegates to collaborate and participate actively in interesting discussions over the next two days. Have a fruitful conference, and please enjoy your visit to Padang.

Sincerely,

Prof. Dr. Tafdil Husni, SE, MBA
Rector of Universitas Andalas

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Jonrinaldi, Ph.D
Dr. Eng. Dicky Fatrias
Dr. Eng. Slamet Raharjo
Prof. Dr. Eng. Ariadi Hazmi
Muhammad Imran Hamid, Ph.D

Keynote Speakers

Prof. Dr. Hadi Nur
Director, Centre for Sustainable Nanomaterials, Ibnu Sina Institute for Scientific and Industrial Research, Universiti Teknologi Malaysia
"Unveiling the Structure-activity Relationship in Material Science: Some Examples in Photocatalyst and Catalyst Materials"

Prof. Dr. Andrivo Rusydi
National University of Singapore
NUS Nanoscience & Nanotechnology Initiative
"More than Moore and Beyond"

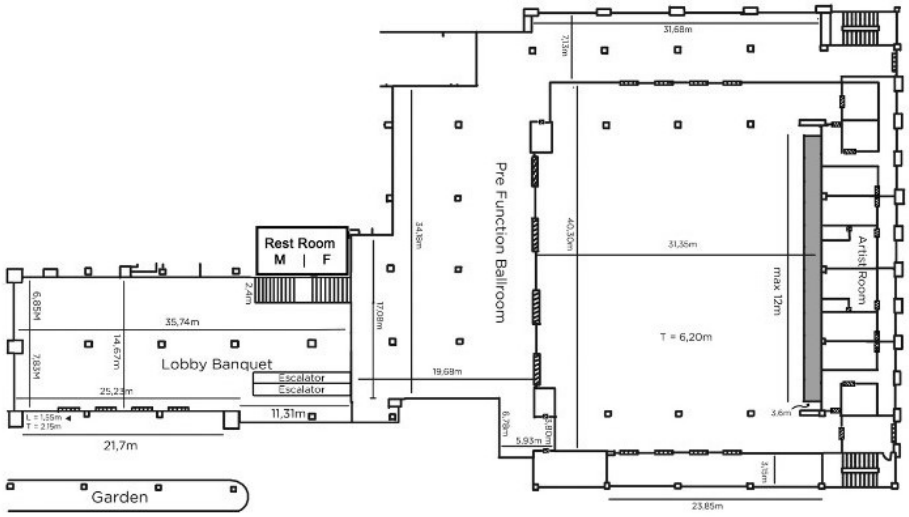
Ir. Insannul Kamil, M.Eng, Ph.D, IPM
Dean, Faculty of Engineering, Universitas Andalas
*Director, Center for Innovation Studies (*CINS*)*
Universitas Andalas
"The Roles of Dams on Sustainable Water, Food and Energy Security Issues: A Global Perspective for Indonesia"

Prof. Dr. David Zhang
University of Exeter, United Kingdom
Director, Exeter Manufacturing and Enterprise Centre (XMEC)
"Metal 3D Printing: New Technology Advances and Future Management Research to Open up its Potential"

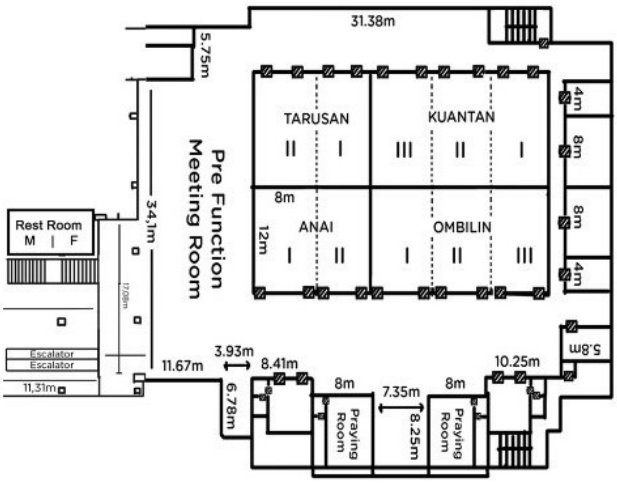
Prof. Dr. Hikita Masayuki
Kyushu Institute of Technology, Japan
"Electrical Insulation Technology in Power Apparatus and Power Electronics"

Conference Venue

LAYOUT PADANG CONVENTION CENTER 1st FLOOR



LAYOUT PADANG CONVENTION CENTER GROUND FLOOR



Conference Program

Day-1: November 8, 2018 (Thursday)

Time	Activity
07.30 – 08.30	**Registration**
08.30 – 10.00	**Opening Ceremony** **Room: Ball Room**
08.30 – 08.40	1. Safety Induction
08.40 – 08.50	2. Recital of Holy Qur'an
08.50 – 09.00	3. National Anthem: Indonesia Raya
09.00 – 09.15	4. Pasambahan Dance
09.15 – 09.25	5. Welcome Message: CITES 2018 Chair - Prof. Dr. Eng. Gunawarman
09.25 – 09.40	6. Welcome Speech and Conference Opening: Rector of Andalas University - Prof. Dr. Tafdil Husni, SE. MBA
09.40 – 09.50	7. Traditional Dance
09.50 – 10.00	8. Do'a
10.00 – 10.30	**Coffee Break**
10.30 – 12.00	**Keynote Sessions I** **Moderator: Ismet Hari Mulyadi, Ph.D** **Room: Ball Room**
10.30 – 11.00	**Keynote 1** "Unveiling the Structure-activity Relationship in Material Science: Some Examples in Photocatalyst and Catalyst Materials" **Prof. Dr. Hadi Nur** *Director, Centre for Sustainable Nanomaterials, Ibnu Sina Institute for Scientific and Industrial Research, Universiti Teknologi Malaysia*
11.00 – 11.30	**Keynote 2** "More than Moore and Beyond" **Prof. Dr. Andrivo Rusydi** *National University of Singapore* *NUS Nanoscience & Nanotechnology Initiative*
11.30 – 12.00	**Q & A**
12.00 – 13.30	**Lunch Break**

13.30 – 15.00	**Parallel Sessions I**	
	Room-1: SUMPUR Room-3: OMBILIN 1 Room-5: KUANTAN 2	Room-2: OMBILIN 2 Room-4: KUANTAN 1 Room-6: ARAU
15.00 – 15.30	**Coffee Break**	
15.30 – 17.00	**Parallel Sessions II**	
	Room-1: SUMPUR Room-3: OMBILIN 1 Room-5: KUANTAN 2	Room-2: OMBILIN 2 Room-4: KUANTAN 1 Room-6: ARAU
17.00 – 19.00	**Preparing to Gala Dinner**	
19.00 – 21.00	**Gala Dinner** PIC: Dr. Oknovia Susanti Room: Ball Room	

Day-2: November 9, 2018 (Friday)

Time	Activity
07.00 – 08.00	**Registration**
08.00 – 09.30	**Keynote Sessions II** Moderator: Feri Afrinaldi, Ph.D Room: Ball Room
08.00 – 08.30	**Keynote 3** "The Roles of Dams on Sustainable Water, Food and Energy Security Issues: A Global Perspective for Indonesia" **Ir. Insannul Kamil, M.Eng, Ph.D, IPM** *Dean, Faculty of Engineering, Universitas Andalas* *Director, Center for Innovation Studies (*CINS*) Universitas Andalas*
08.30 – 09.00	**Keynote 4** "Metal 3D Printing: New Technology Advances and Future Management Research to Open up its Potential" **Prof. Dr. David Zhang** *University of Exeter, United Kingdom* *Director, Exeter Manufacturing and Enterprise Centre (XMEC)*
09.00 – 09.30	**Keynote 5** "Electrical Insulation Technology in Power Apparatus and Power Electronics" **Prof. Dr. Hikita Masayuki** *Kyushu Institute of Technology, Japan*

09.30 – 10.00	**Q & A**	
10.00 – 10.15	**Coffee Break**	
10.15 – 11.45	**Parallel Sessions III**	
	Room-1: SUMPUR Room-3: OMBILIN 1 Room-5: KUANTAN 2	Room-2: OMBILIN 2 Room-4: KUANTAN 1 Room-6: ARAU
11.45 – 13.30	**Lunch Break**	
13.30 – 15.00	**Parallel Sessions IV**	
	Room-1: SUMPUR Room-3: OMBILIN 1 Room-5: KUANTAN 2	Room-2: OMBILIN 2 Room-4: KUANTAN 1 Room-6: ARAU
15.00 – 15.30	**Coffee Break**	
15.30 – 16.30	**Closing Ceremony** PIC: Elita Amrina, PhD Room: Ball Room	

Day-3: November 10, 2018 (Saturday)

Time	Activity
08.00 – 18.00	**Conference Tour** PIC: Elita Amrina, PhD Picking Point: Grand Inna Padang Hotel

Parallel Sessions

Parallel Sessions I

Date : November 8, 2018 (Thursday)
Time : 13.30 – 15.00

Room-1 : Sumpur
Topics : Industrial Engineering
Session Chair : Dr. Eng. Dicky Fatrias

Time	Presentation
13.30 – 13.45	**ID 440** Setup Time Efficiencies of Quick Die Change System in Metal Stamping Process *Rudi Kurniawan Arief, Qomarotun Nurlaila*
13.45 – 14.00	**ID 449** Analysis of Production Line Balancing Using Theory of Constraints Rosnani Ginting, Vita Sari Gumay
14.00 – 14.15	**ID 467** A Framework to Improve Equipment Effectiveness of Manufacturing Process - A Case Study of Pressing Station of Crude Palm Oil Production, Indonesia *Anita Susilawati, Adek Tasri, Dodi Arief*
14.15 – 14.30	**ID 471** Identification Criteria and Indicators of Palm Oil Industrial Solid Waste Processing Technology *Aulia Ishak, Amir Yazid Bin Ali*
14.30 – 14.45	**ID 189** Formulation of Optimization Model of Raw Material Composition to Achieve Clinker Quality Standards (Case Study PT Semen Padang Plant IV) *Syamsurrijal*
14.45 – 15.00	**ID 512** Chili Sauce Production Planning Model Considering Raw Material Availability: An application of Mixed Integer Linear Programming *Jonrinaldi, Alexie Herryandie Bronto Adi, Resti Novira*

Room-2 : Ombilin 2
Topics : Mechanical Engineering
Session Chair : Prof. Dr.-Ing. Hairul Abrar

Time	Presentation
13.30 – 13.45	**ID 435** Analysis on Cracks Extension in Welding Zone in Stainless Steel Pipe Used at High Pressure Decomposer Equipment *Husaini, Muhammad Najib, Iskandar Hasanuddin*
13.45 – 14.00	**ID 482** Thermal Characteristics and Phase Transformation of Iron Ores Containing Varied Crystalline Water with Coal Mixtures

	Masdipa M F Sinuhaji, Sri Harjanto, , Abdul Hapid
14.00 – 14.15	**ID 507** Effect of Pouring Temperatures on Porosity and Mechanical Properties of Gravity Die Casting Magnesium Alloy *Is Prima Nanda, Muhammad Hafiz Jahare, Mohd Hasbullah Idris, S. Bhupal Kumar, Mohd Hazwan Hassim, Andril Arafat*
14.15 – 14.30	**ID 564** Hydroxyapatite Coating on Titanium Alloy TNTZ using Electrophoretic Deposition *Gunawarman, Nuzul Ficky Nuswantoro, Arif Budiman, Djong Hon Tjong, Menkher Manjas*
14.30 – 14.45	**ID 508** Mechanical and Degradation Properties of Zink Adopted Magnesium Alloys for Biomedical Application *Is Prima Nanda, Mohd Hazwan Hassim, Mohd Hasbullah Idris, Muhammad Hafiz Jahare, Samir Sani Abdulmalik, Andril Arafat*
14.45 – 15.00	**ID 480** The Effect of Alum Addition on Shrinkage Temperature, Chemical Properties and Morphology in the Manufacture of Vegetable-Tanned Leather *Emiliana Kasmudjiastuti, Bidhari Pidhatika, Gresy Griyanitasari, Iwan Fajar Pahlawan*

Room-3 : Ombilin 1
Topics : Civil Engineering
Session Chair : Yossyafra, Ph.D

Time	Presentation
13.30 – 13.45	**ID 163** Study of Implementation Traffic Control Zone On Road Works *Rio Andika, Purnawan, Elsa Eka Putri*
13.45 – 14.00	**ID 359** Analytical Network Process (ANP) for Priority Setting of Strategic Roads Handling at Tebo Regency *Yosritzal, Jerri Permana, Bambang Istijono, Benny Hidayat, Taufika Ophiyandri, Hendra Gunawan*
14.00 – 14.15	**ID 510** Intersection Performance Evaluation and Designing Intersection At Concourse Between Arterial Road and Ramp Of Medan-Kualanamu-Tebing Tinggi Highway *Amrizal, Ahmad Hamas Sorimatua Harahap*
14.15 – 14.30	**ID 582** Determining the Priority of New Road Development According to the West Sumatera Provincial Government Perception *Rahma Dewi Susanti, Purnawan, Yossyafra*
14.30 – 14.45	**ID 553** Sensitivity Analysis of Stormpav Composite Pavement *Elsa Eka Putri, Florida Jun ak Henry Rewani, Constontine Lee Lim Fah, Md Abdul Mannan, Wan Hashim Wan Ibrahim, Mohamad Raduan Kabit, Larry Silas Tirau, Ron Aldrino Chan @ Ron Buking*
14.45 – 15.00	**ID 654** Immersion Marshall Test Of Warm Mix Asphalt Polymer Using Bayat Natural Zeolite *Ani Tjitra Handayani, S. N. Peni, H. Pandita*

Room-4 : Kuantan 1
Topics : Electrical Engineering
Session Chair : Prof. Dr.Eng. Ariadi Hazmi

Time	Presentation
13.30 – 13.45	**ID 428** Design and Implementation of Microstrip Patch Ultra-wide Band Antenna for Detection of UHF Partial Discharge *Z Nawawi, M A B Sidik, M I Jambak, N Ahmad, M H Ahmad, C L G P Kumar, E P Waldi, Aulia*
13.45 – 14.00	**ID 433** Overcurrent Relay Coordination with Grid-Connected and Islanding Capability on Distribution Network with Distributed Generation *Adrianti, Sri Wahyuni, Muhammad Nasir*
14.00 – 14.15	**ID 660** Modification of Arm Patch of Double Layer Printed Antenna for Partial Discharge Detection Umar Khayam, Yuda Muhammad Hamdani
14.15 – 14.30	**ID 558** Development of HFCT sensor for partial discharge sensors *E P Waldi, A Y Frenzi, R Fernandez, Darmawan, Darwison, H D Laksono, Aulia, Novizon, A Hazmi, H Abral, S Arief, Z Nawawi, M H Ahmad, N Hozumi*
14.30 – 14.45	**ID 661** Design and Application of Trapezoid Periodic Log Antenna to Detect Partial Discharge *Umar Khayam, Arpan Zaeni, Miftahul Husna*
14.45 – 15.00	**ID 534** Partial Discharge Pulses Characteristics of LDPE-NR Bionanopolymer as The Electrical Insulation under AC Voltage *Aulia, Eka Putra Waldi, Darwison, Novizon, M Heru Setiawan, Dwi Gustiono, Dody Andi Winarto, Yoggi Nugraha, M A Hafizi, Zainuddin Nawawi, M Abubakar Sidik*

Room-5 : Kuantan 2
Topics : Electrical Engineering
Session Chair : Dr. Eng. Ilhamdi Rusydi

Time	Presentation
13.30 – 13.45	**ID 514** Real Time Condition Monitoring System of Gapless Arrester Based on ZigBee Protocol and Third Harmonic Leakage Current as Indicator Parameters *Novizon, S Aliffianti Ulfiah, Z Abdul Malek, Syafii, N Riska, Aulia, Darwison*
13.45 – 14.00	**ID 515** Condition Based Monitoring of Gapless Surge Arrester Using Electrical and Thermal Parameters *Novizon, Z Abdul Malek, Syafii, M H Ahmad, Aulia, S Aliffianti Ulfiah*
14.00 – 14.15	**ID 535** The Tensile Properties of Alumina dan Silica Bionanocomposite Material for High Voltage Insulation

	Aulia, Eka Putra Waldi, M Heru Setiawan, Dwi Gustiono, Darwison, Novizon, Yoggi Nugraha, Abdurrahman, M A Hafizi, Zainuddin Nawawi
14.15 – 14.30	**ID 516** Power Loss Estimation of Polymeric Housing Surge Arrester using Leakage Current and Temperature Approach *Novizon, Z Abdul Malek, M H Ahmad, E P Waldi, H D Laksono, N Riska*
14.30 – 14.45	**ID 580** Morphological Characteristic of Preliminary Breakdown Pulses of Hybrid Intra Cloud - Negative Cloud to Ground Lightning on Low Lattitude Region *Primas Emeraldi, Muhammad Imran Hamid, Ariadi Hazmi*
14.45 – 15.00	**ID 611** Characteristics of acoustic signals from lightning using a microphone array observation system *Ariadi Hazmi*

Room-6 **:** Arau
Topics **:** Environmental Engineering
Session Chair **:** Dr. Eng. Slamet Raharjo

Time	Presentation
13.30 – 13.45	**ID 479** The Use of Protein Binder from Shaving Waste for Leather Finishing: Judging from the Physical, Chemical, and Morphological Properties of Lizard Skin Leather *Sri Sutyasmi, Iwan Fajar Pahlawan, Gresy Griyanitasari*
13.45 – 14.00	**ID 483** Food Packaging Development of Bioplastic from Basic Waste of Cassava Peel (Manihot uttilisima) and Shrimp Shell *Dasumiati, N Saridewi, M Malik*
14.00 – 14.15	**ID 617** Preliminary Study of Solid Waste Management of Tourist Area in Pariaman City *Rizki Aziz, Amira*
14.15 – 14.30	**ID 628** The Effect of Additional Vegetables and Fruits Waste on the Quality of Compost of Cassava Chip Industry Solid Waste on Takakura Composter *Yommi Dewilda, Rizki Aziz, RA Handayani*
14.30 – 14.45	**ID 505** Minimization of Household Hazardous Solid Waste (HHSW) with 4R Concepts (Reduce, Reuse, Recycle and Recovery) in Padang City, Indonesia *Yenni Ruslinda, Slamet Raharjo, Yommi Dewilda, Hidayatullah, Rizki Aziz*
14.45 – 15.00	**ID 539** Greenhouse Knockdown in Merauke *Muchlis Alahudin, Reinyelda D. Latuheru, Ni Luh Sri Suryaningsih*

Parallel Sessions II
Date : November 8, 2018 (Thursday)
Time : 15.30 – 17.00

Room-1 : Sumpur
Topics : Industrial Engineering
Session Chair : Jonrinaldi, Ph.D

Time	Presentation
15.30 – 15.45	**ID 477** A System for Improving Evaluation Suppliers: The Case of Procurement in Education Institution (Case Study: Andalas University) *Mohammad Farid, Rika Ampuh Hadiguna, Insannul Kamil*
15.45 – 16.00	**ID 465** Investigation of Gender Influence on Behavioral Intention towards the Use Behavior of Mobile Internet Technology *Nurdinintya Athari, Nopendri*
16.00 – 16.15	**ID 478** The Role of Dams on Water, Food and Energy Security Issues: A Global Review and Resolution for Indonesia *Insannul Kamil, Mego Plamonia, Berry Yuliandra, Chitrakala Muthuveerappan, Buang bin Alias*
16.15 – 16.30	**ID 645** Waste Assessment Using Lean Approach in Receiving Process of Container Terminal: A Case of Teluk Bayur Port *Elita Amrina, Insannul Kamil, Dodi Rahmad*
16.30 – 16.45	**ID 426** Bankruptcy Prediction of Listed Cement Company in Indonesian Stock Exchanges Using Altman Z-Score Model *Arifia Fitriani, Alizar Hasan, Ahmad Indrapriyatna, Aslim Awaludin Janas*
16.45 – 17.00	**ID 498** The Impact of Strategy Planning on Small Medium Enterprise Performance in West Sumatera *Alizar Hasan, Prima Fithri, Muhammad Isra*

Room-2 : Ombilin 2
Topics : Mechanical Engineering
Session Chair : Firman Ridwan, Ph.D

Time	Presentation
15.30 – 15.45	**ID 462** The Determination of Workspace and the Performance Evaluation of PRoM-120 with 3 and 4 Kinematic Constants *Adriyan, Sufiyanto*
15.45 – 16.00	**ID 550** Natural Frequencies of Twisted Cantilever Beam *Jhon Malta, Jefri, Mulyadi Bur, Eka Satria*
16.00 – 16.15	**ID 592** The Development of Two Wheel Mobil Robot : Generated Path Using Simulation and Actual Path of Mobile Robot are Compared *Teuku Firsa, Muhammad Tadjuddin, Iskandar, Syahriza*

16.15 – 16.30	**ID 594** Experimental Evaluation of Tuned Liquid Column Damper and Tuned Mass Damper in a Space Structure Model *Lovely Son, Mulyadi Bur, Alhamdi D Andria*
16.30 – 16.45	**ID 629** Numerical Analysis of U-Shaped Hysterisis Steel Damper with Energy Absorber for Seismic Areas *Eka Satria, Lovely Son, Mulyadi Bur, Sabril Haris, Muhammad Dzul Akbar*
16.45 – 17.00	**ID 652** The Potential of Rise Husk Fibre/Native Sago Starch Reinforced Bio Composite for Automotive Interior Component *Nusyirwan, Hairul Abral, Misbahul Hakim, Rana Vadia*

Room-3 : Ombilin 1
Topics : Mechanical Engineering
Session Chair : Dr. Eng. Eka Satria

Time	Presentation
15.30 – 15.45	**ID 484** Design Analysis of the Spur Gear of Perpetual Motion Machine *Risal Abu, Irmayani, Rozza Linda*
15.45 – 16.00	**ID 532** Effect of Garlic Oil as Lubricant Additives in Coconut and Palm Oils on the Physical and Tribological Properties *Dedison Gasni, Devi Chandra, A A Putra, R Fajri*
16.00 – 16.15	**ID 647** The Effect of Solar Water Heater Performance by Variation of Plate Shaped *Darwin Harun, M. Ilham Maulana, Akhyar*
16.15 – 16.30	**ID 653** The Effect of Particle Compositions on the Activation Energy of PA6/Bagasse Composite *Sulaiman Thalib, Syifaul Huzni, Syarizal Fonna, Che Husna Azhari, Sarani Zakaria*
16.30 – 16.45	**ID 648** The Experimental Performance of Semi-Cylindrical Type of Concentrator Solar Collector on the Addition of Heat Storage Material *Darwin Harun, Zulfadhli, Akhyar*
16.45 – 17.00	**ID 625** Design of Solid Desiccant Air Conditioning System *Dendi Adi Saputra M, Nanda Agna Saputra, Lusi Susanti, Prima Fithri, Dody Ichwana Putra*

Room-4 : Kuantan 1
Topics : Electrical Engineering
Session Chair : Aulia, Ph.D

Time	Presentation
15.30 – 15.45	**ID 552** Performance Analysis of Error Control Coding and Diversity in Image Transmission on Wireless Channels *Baharuddin, Mumuh Muharam, Henalde Andre, Rina Angraini*
15.45 – 16.00	**ID 612** Wireless Monitoring System for Comparison Photovoltaic and Photovoltaic Thermal Characteristics

	Krismadinata, Remon Lapisa, Asnil
16.00 – 16.15	**ID 567** PWM Speed Control of DC Permanent Magnet Motor using PIC18F4550 Mikrocontroller *Mira Wellya Fatma, Muhammad Imran Hamid*
16.15 – 16.30	**ID 620** Robot Mobile Control Based on Three EMG Signals Using Artificial Neural Network *M Ilhamdi Rusydi, Illa Aryeni, Joefrinaldo, Zhulfan Romadhon, Andrivo Rusydi*
16.30 – 16.45	**ID 554** Performance Evaluation Image Transmission using Diversity Selection Combining Technique *Baharuddin, Rina Angraini*
16.45 – 17.00	**ID 622** Towards Hand Gesture Based Control of Virtual Keyboards for Effective Communication *M Ilhamdi Rusydi, Oktrison, Willy Azhar, O Williams Samuel, Febdian Rusydi*

Room-5 **:** Kuantan 2
Topics **:** Electrical Engineering
Session Chair **:** Dr. Eng. Abdul Rajab

Time	Presentation
15.30 – 15.45	**ID 466** Design of Poka-yoke System Based on Fuzzy Neural Network for Rotary-Machinery Monitoring *Mumuh Muharam, Melda Latif*
15.45 – 16.00	**ID 542** Multichannel Audio Steganography Based on MPEG Surround using Direct Sequence Spread Spectrum *Micko Tomas, Baharuddin, Ikhwana Elfitri*
16.00 – 16.15	**ID 486** Understanding Public Perception of Domestic Solar Water Heating System: Case Study in Surabaya, Indonesia *Elieser Tarigan, Kenneth Ritter*
16.15 – 16.30	**ID 607** Design of Fuzzy Logic Controller for Temperature Control of Small-scale Food Storage *Melda Latif, Mumuh Muharam, Darmawan, Darwison, Reynaldo Revila Costa*
16.30 – 16.45	**ID 597** Dipole Planar Bowtie Printed Antenna for ISM Application *Hanalde Andre, Rudy Fernandez, Baharuddin*
16.45 – 17.00	**ID 662** Comparison of Partial Discharge Signal Denoisation Results using Hard Threshold and Soft Threshold Methods and Wavelet Transformation with Some Levels *Arpan Zaeni, Tria Kasnalestari, Umar Khayam*

Room-6 : Arau
Topics : Civil Engineering
Session Chair : Taufika Ophyandri, Ph.D

Time	Presentation
15.30 – 15.45	**ID 178** The Effects of the Distance Between Groundsill and Double Cylinder-Piers Against the Scour Patterns *Muhammad Thaahaa, Mas Mera*
15.45 – 16.00	**ID 450** Identification of Construction Management System (CMS) in Construction Projects In Padang City *Benny Hidayat, Akhmad Suraji, Rio Frankly*
16.00 – 16.15	**ID 600** Shear Behavior of Fly Ash Reinforced Concrete Beam Without Shear Reinforcement *Ari Endra Nasution, Ruddy Kurniawan, Rendy Thamrin*
16.15 – 16.30	**ID 456** Analysis of Maintenance Management and Building Care In State University of Padang (Case Study of Educational And Office Building In State University of Padang) *Budi A Kombino, Benny Hidayat, Taufika Ophiyandri*
16.30 – 16.45	**ID 556** Infrastructure Maintenance System for Community Development Projects to Improve the Quality of Infrastructure Services in West Sumatra Province *Gusni Vitri, H Herman*
16.45 – 17.00	**ID 459** Building Official`s Awareness in Term of Building Permit System in Indonesia *Eka Juliafad, Totoh Handayono*

Parallel Sessions III

Date : November 9, 2018 (Friday)
Time : 10.15 – 11.45

Room-1 : Sumpur
Topics : Industrial Engineering
Session Chair : Elita Amrina, Ph.D

Time	Presentation
10.15 – 10.30	**ID 427** Analysis of the Application of Quality Management Systems in Rubber Industry Based on ISO 9001:2015 *Nofriani Fajrah, Nilda Putri, Elita Amrina*
10.30 – 10.45	**ID 575** Optimization of Significant Factors of Cement Compressive Strength at PT Semen Padang *Prima Fithri, Difana Meilani, Nilda Tri Putri, Chotimah F H*
10.45 – 11.00	**ID 573** Technical Characteristics Determination of Crumb Rubber Product by using Quality Function Deployment (QFD)

	Phase I *Rosnani Ginting, Widodo*
11.00 – 11.15	**ID 656** The Analysis of Judgmental Forecasting Based on the Availability of Contextual Information *Inna Kholidasari, Lestari Setiawati, Rahmi Selta Opera Endro*
11.15 – 11.30	**ID 506** Application of Indoor Foliage Plants in Visual Inspection Activities *Desto Jumeno*
11.30 – 11.45	**ID 491** Assessing Safety Performance of Tire Retreading Production Employees *Prima Fithri, Eri Wirdianto, Astari Yoselina*

Room-2 : Ombilin 2
Topics : Mechanical Engineering
Session Chair : Dr. Oknovia Susanti

Time	Presentation
10.15 – 10.30	**ID 531** Sound Absorption Characteristics of Natural Fibrous Material from Coconut Coir, Oil Palm Fruit Bunches and Pineapple Leaf *Meifal Rusli, Muhammad Irsyad, Hendery Dahlan, Gusriwandi, Mulyadi Bur*
10.30 – 10.45	**ID 570** Synthesis and Characterization of Calcium Precursor for Hydroxyapatite Synthesis from Blood Clam Shell (Anadara antiquata) using Planetary Ball Mill Process *Gunawarman, Jon Affi, Ilhamdi, Dian Juliadmi, Amalul Ahli*
10.45 – 11.00	**ID 583** Production of Pig Iron Nugget from Low-Grade Iron Ore and Pyrolyzed Oil-Palm-Empty-Fruit-Bunch Composites *A Setiawan, R P Suratha, S Harjanto, E Kusrini*
11.00 – 11.15	**ID 646** Characterization on Particle Size Distribution Of Reduced Lateritic Nickel Ore Using Biomass Carbon Reductor *Faizinal Abidin, Sri Harjanto, Adji Kawigraha, Nur Vita Permatasari*
11.15 – 11.30	**ID 650** Tensile Properties and Transparency of Poly-vinyl Alcohol (PVA) Film Using Ultrasonication Method *Hairul Abral, Arief Atmajaya, Fadli Hafizulhaq, Dian Handayani*
11.30 – 11.45	**ID 643** Optimization of Maxtrix Compositions of Al2O3, SiO2, Caolin and CaO on the Mechanical Properties of a Geopolimer Composite With Short Carbon Fibre *Jamiatul Akmal, Muhammad Badaruddin, Muhamad Kresna Ismoyo, Suripto Dwi Yuwono*

Room-3 : Ombilin 1
Topics : Electrical Engineering
Session Chair : Adrianti, Ph.D

Time	Presentation
10.15 – 10.30	**ID 528** Harmonic Analysis in Electrical System at Andalas University Hospital *Nur Afni, Eka Putra Waldi, Refdinal Nazir*
10.30 – 10.45	**ID 548** Voltage Stability Evaluation Based on Power Flow Analysis Using Newton Raphson Method (Case Study: Central and South Sumatra Subsystem) *Muhammad Abdel Haq, Syafii, Heru Dibyo Laksono*
10.45 – 11.00	**ID 566** Study on Static Electrification of PFAE-Mineral Oil Mixture *Abdul Rajab, Harry Gumilang, Motoo Tsuchie, M Kozako, M Hikita, Takashi Suzuki*
11.00 – 11.15	**ID 572** Analysis of the unbalanced harmonic propagation in three-phase power system using a parallel program *Syukri Yunus, Aulia, Refdinal Nazir, Uyung Gatot S Dinata*
11.15 – 11.30	**ID 644** Satic VAR Compensator for Improving Voltage Profiles and Transmission Losses: Case Study in Batam *Syukri Yunus, Yuni Ika Rahmi, Refdinal N, Aulia, Uyung G. S. D*
11.30 – 11.45	**ID 581** The Polymeric Insulator Leakage Current Forecast Using ANFIS the Thermal Image Has Been Pre-processed with LabView *Darwison, Syukri Arief, Hairul Abral, Ariadi Hazmi, Novizon, Aulia, Eka Putra Waldi*

Room-4 : Kuantan 1
Topics : Civil Engineering
Session Chair : Masrilayanti, Ph.D

Time	Presentation
10.15 – 10.30	**ID 673** Earthquake-friendly Foundation using Web of Concrete Ribs With Vertical Wedge *Ryantori*
10.30 – 10.45	**ID 439** Simulation of The Effect of Floodway on Batang Kandis River Flood Control *Junaidi, Seri Marona, Dalrino*
10.45 – 11.00	**ID 565** The Study of River-Bed Change and Bed-load Transport in the Middle Segment of the Batang Kuranji River *Junaidi, E D E Putra, A Junaidi, Sunaryo, Nurhamidah*
11.00 – 11.15	**ID 469** The Implementation of Sustainable Community-Based Enviromental Sanitation Development Policy (slbm) in Tebo Regency *Benny Hidayat, Taufika Ophiyandri, Andriwan Tudi*
11.15 – 11.30	**ID 636** Determining the Priority Criteria and Rangking of Provincial Bridge Maintenance in West Sumatra Using a

	Combination of the Fuzzy Analytical Hierarchy Process and Vikor-Modification Methods *Yossyafra, Nike Angelia, Yosritzal, Meyadtri, D I Mazni*
11.30 – 11.45	**ID 665** Seismic Retrofitting Analysis Using Concrete Jacketing and Shear Wall on RC Frame Structure *Fauzan, Febrin Anas Ismail, Zev Al Jauhari*

Room-5 : Kuantan 2
Topics : Environmental Engineering
Session Chair : Dr. Eng. Zulkarnaini

Time	Presentation
10.15 – 10.30	**ID 496** Effect of Tannery Wastewater Exposure on Chromium Detected in the Gill of *Oreochromis niloticus* *Tivany Edwin, Taufiq Ihsan, Hesti Tiara Tamsin*
10.30 – 10.45	**ID 598** Distribution of Organic Contamination based on Depth Stratification in Maninjau Lake, Indonesia *Puti Sri Komala, Ansiha Nur, Ikrima Nazhifa*
10.45 – 11.00	**ID 474** Geometric Accuracy Improvement of Very High Resolution Optical Data using TerraSAR-X DSM to Support Disaster Management in Indonesia *I.L. Sari, S. E. Siwi, R. P. Brahmantara, H.S. Dyatmika, A Suprijanto, K. A. Pradono, M Haidar*
11.00 – 11.15	**ID 632** Column Study of Aluminium Adsorption from Groundwater by Natural Pumice *Shinta Indah, Denny Helard, Fatilla Hudawaty*
11.15 – 11.30	**ID 608** Study of the Effect of Pipe Diameter Changes on the Properties of Fluid in Closed Channels Using Osborne Reynold Apparatus *Ansiha Nur, Reri Afrianita, Rhanda Dian Tri Fani Ramli*
11.30 – 11.45	**ID 631** Effects of Different Pre-treatment Methods on Anaerobic Mixed Microflora for Hydrogen Production and COD Reduction from Domestic Effluent *Budhi Primasari, Muhammad Z A Tamin, Muhammad A H Mustafa*

Room-6 : Arau
Topics : Mechanical Engineering
Session Chair : Dr. Eng. Jon Affi

Time	Presentation
10.15 – 10.30	**ID 651** Surface Characterization of The Ceramic Coating Process on Aluminum Matrix Composite Reinforced Particulate *Hendri Sukma, Dwi Rahmalina, Bambang Sulaksono, Erlanda A. Pane*
10.30 – 10.45	**ID 658** Hardness and Impact Energy Absorbed Produced by Q&T Steel and DQ&T Steel *Yurianto, Pratikto, Rudy, S., Wahyono, S., Eflita, Y., Agus, S., Yusuf, U.*

10.45 – 11.00	**ID 666** The needs to investigate the effect of road surface vibrations to the fatigue life of a coil spring *Masri Ali, Husaini, T. E. Putra , Nurdin Ali*
11.00 – 11.15	**ID 663** Mechanical Properties of Mild Steel by Adding *Theobroma cacao* Peels Extract (TCPE) Inhibitor *Yuli Yetri, Gunawarman, Rahmi Hidayati, Aidil Zamri*
11.15 – 11.30	**ID 670** Effect of Coating Time and Protective Current on Thickness of Paint Layer of Steel ST-37 by Continuous Painting *Zuldesmi Mansjur, Arrijani, Moh. Fachruddin Suharto*
11.30 – 11.45	**ID 659** In vitro of Mg-1.6 Gd alloys after Hot extruded for Biomaterial Application *Oknovia Susanti, Endang W.Bachtiar, Sri Harjanto, Gunawarman*

Parallel Sessions IV

Date : November 9, 2018 (Friday)

Time : 13.30 – 15.00

Room-1 : Sumpur

Topics : Industrial Engineering

Session Chair : Hilma Raimona Zadry, Ph.D

Time	Presentation
13.30 – 13.45	**ID 423** An Evaluation on Dr. M. Djamil Hospital Padang Parking Lot Capacity *Alfadhlani, Winni Septi Fanny Yasrin, Feri Afrinaldi*
13.45 – 14.00	**ID 536** Designing of Welding Jig for Productivity Improvement and Costsavings in Threshers Cover Assembly : A Case Study on CV Citra Dragon Assembly Plant *Ismet Hari Mulyadi, Nilda Tri Putri, Fadiel Muhammad*
14.00 – 14.15	**ID 472** Design of Ergonomic Grated Coconut Squeezer *Diana Chandra Dewi, Novrianti, Corry Handayani, Okta Wulandari, Iis Nurhayati*
14.15 – 14.30	**ID 503** The Effect of Regular Physical Activity and Smoking Habit on Bone Mass among Male Industrial Workers in Padang, West Sumatra: A Cross-Sectional Study *Rahmi Elviana, Lusi Susanti, Hilma Raimona Zadry*
14.30 – 14.45	**ID 658** Strengthening Community Readiness to Disasters Through Songs *Sastra Munafri, Ikhwan Arief*

Room-2 : Ombilin 2
Topics : Mechanical Engineering
Session Chair : Dr. Eng. Jhon Malta

Time	Presentation
13.30 – 13.45	**ID 530** The Influence of Number of Solution Candidate on Performance of Boundary Element Inverse Analysis in Detecting Rebar Corrosion *Syarizal Fonna, Gunawarman, Syifaul Huzni, A K Ariffin*
13.45 – 14.00	**ID 557** Corrosion Resistance of β type titanium (TNTZ) in NaCl 3% Solution *Jon Affi, Yuli Yetri, Nurbaiti, H Fajri, Syafrizal Fonna, Gunawarman*
14.00 – 14.15	**ID 599** Atmospheric Corrosion Map of Structural Steel in Industrial Area: A Preliminary Investigation *Syifaul Huzni, Affandi, Iqbal Tanjung, Syarizal Fonna*
14.15 – 14.30	**ID 624** Corrosion Potential of Reinforced Steel in Reinforced Concrete in Kabupaten Bireun: Analysis of Ground Water Content Used as a Concrete Mixture *Kurnia R D I, Suhaimi, Syifaul Huzni, Syarizal Fonna*
14.30 – 14.45	**ID 669** Corrosion Behavior of Ti6Al4V ELI Coated Bioceramics in Artificial Saliva at Fluctuating Temperatures *Riza Muharni, Gunawarman, Yuli Yetri*
14.45 – 15.00	**ID 649** Analysis of Cutting Forces and Surface Roughness of Fibre Reinforced Polimer for End Mill Processes *Firman Ridwan, Refki Havendri, Oknovia Susanti, Gusriwandi, Yulhizhar*

Room-3 : Ombilin 1
Topics : Electrical Engineering
Session Chair : Dr. Eng. Rahmadi Kurnia

Time	Presentation
13.30 – 13.45	**ID 497** Performance of Impedance Measurement Algorithm Applied in Line with Compensation Circuit *Nanang Rohadi*
13.45 – 14.00	**ID 605** Improving the Quality and Quantity of Cinnamon Drying Process Using Art Cave in Lambung Bukit West Sumatra *Amimul Ummah Baiqi, Pepi Putri Utami, Dicky Anugrah, Ade Al fauzan, Windi Surya Ningsih, Muhammad Ilhamdi Rusydi*
14.00 – 14.15	**ID 500** Parametric Sensitivity Analysis of SEL-421 Distance Relay Algorithms Used in Compensated Line *Nanang Rohadi*
14.15 – 14.30	**ID 486** Understanding Public Perception of Domestic Solar Water Heating System: Case study in Surabaya, Indonesia *Elieser Tarigan, Kenneth Ritter*
14.30 – 14.45	**ID 672** Preliminary Results on the Developmentof Monoester Type Insulating Oil From Coconut Oil

	A. Rajab, F. E. Putra, J. S. Ramadhani, M. S. I. Silitonga, R. Kurniawan, K. Qibran, Melda L, M. I. Hamid
14.45 – 15.00	**ID 674** Experiment of a Two-stage Propeller Wind Turbine in a Wind Tunnel Under Various Mechanical Loads *Uyung Gatot S. Dinata, Muhammad Harris*

Room-4 **:** Kuantan 1
Topics **:** Environmental Engineering
Session Chair **:** Dr. Eng. Shinta Indah

Time	Presentation
13.30 – 13.45	**ID 667** Utilization of Activated Bentonits as Adsorben Phosphor Elements Contained in WWTP Factory Palm Oil *Susila Arita, Widi Hartati, Lusi Septiarini, Desfournatalia, Naswir M.*
13.45 – 14.00	**ID 468** Fatigue Analysis to Driver of Intercity in Province (AKDP) West Sumatra A Case Study Route of Padang Bukittinggi Payakumbuh *Taufiq Ihsan, Yaumal Arbi, Intan Purnama Sari*
14.00 – 14.15	**ID 633** Molecular identification of lactic acid bacteria potentially as starter isolated from biogas sludge made by cattle feces and the application of biogas into elpiji tube *N Sari, H Purwanto, I Suliansyah and E Purwati*
14.15 – 14.30	**ID 668** Spatial Distribution of Coliform Bacteria in Batang Arau River, Padang, West Sumatera, Indonesia *Denny Helard, Shinta Indah, M. Wilandari*
14.30 – 14.45	**ID 655** Analysis of Water Balance Maninjau Lake West Sumatera *Sunaryo, Yen Dwi Nola, Bambang Istijono, Junaidi*
14.45 – 15.00	**ID 691** Critical Success Factors in Post-Disaster Reconstructuion, Lesson Learnt for Reconstruction Plan *Taufika Ophiyandri, Benny Hidayat, Bambang Istijono*

Room-5 **:** Kuantan 2
Topics **:** Industrial Engineering
Session Chair **:** Dr.Eng. Desto Jumeno

Time	Presentation
13.30 – 13.45	**ID 432** Gap Analysis Between Production and Market Demand of Patchouli Oil in West Pasaman Using System Dynamic *Dina Rahmayanti, Santosa, Novizar Nazir, Rika Ampuh Hadiguna*
13.45 – 14.00	**ID 657** The Evaluation of Bullwhip Effect on Distribution System of a Supply Chain Using Centralized Demand Information Method *Inna Kholidasari, Ayu Bidiawati JR, Melani Eka Sari*
14.00 – 14.15	**ID 485** The Location-allocation Decision under the Dynamic Increment of Demand for Selecting the Local Distribution Centers to Face Sumatra Megathrust: Study Case of Padang City *Liperda Rahmad Inca, Sirivongpaisal Nikorn*

14.15 – 14.30	**ID 443** Evaluation Achievement of Innovation at SMEs Snacks *Insannul Kamil, Albert Harfri, Rika Ampuh Hadiguna*
14.30 – 14.45	**ID 671** Relative Displacement Effects of Integral Bridges due to Vertical Earthquake Loads *Masrilayanti, Weekes L*

Room-6 : Arau
Topics : Electrical Engineering
Session Chair : Novizon, PhD

Time	Presentation
13.30 – 13.45	**ID 585** Increasing the Quality and Power Capasity of HERIC PV-Inverter trough Multilevel Topologi Implementation *Muhammad Imran Hamid, Dicky Ardiansyah*
13.45 – 14.00	**ID 610** Shape Object Selection Using Chi Square Method *Rahmadi Kurnia, Fitri Kurnia, Fitrilina*
14.00 – 14.15	**ID 571** Partial Discharge Characteristics of Nanosilica Biopolymer under AC Voltage *Aulia, Eka Putra Waldi, Darwison, Mahendra Anggaravidya, Novizon, M Heru Setiawan, Yoggi Nugraha, Abdurrahman, M A Hafizi, Irfan Jambak*
14.15 – 14.30	**ID 623** Development of Rogowski Coil Sensor for Partial Discharge Detection *E P Waldi, A Y Frenzi, R Fernandez, Darmawan, Darwison, H D Laksono, Aulia, A Hazmi, H Andre, H Abral, S Arief, Z Nawawi, M H Ahmad, N Hozumi*

Abstracts

Parallel Sessions I

Date : November 8, 2018 (Thursday)
Time : 13.30 – 15.00

Room-1	**:**	Sumpur
Topics	**:**	Industrial Engineering
Session Chair	**:**	Dr. Eng. Dicky Fatrias

ID 440
Setup Time Efficiencies of Quick Die Change System in Metal Stamping Process

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The rapid developing of technology today has forced manufacturing companies to widely expands their business and production abilities. Efficiencies in all aspects must be taken to maximized production capacity and reduce waste to survive. Lean's SMED technique is one of waste reduction method that usually used in manufacturing companies and specifically called the Quick Die Change (QDC) for metal stamping companies. But some research related to QDC only discuss about the setup tools and operator movement during setup and process. This research observed the setup process of the die construction that has been modify to be able to reduce the setup time and other time wasted activities. This QDC die construction could save setup time by 60% compared to conventional die and could do more if carefully planned. Research conducted in an automotive spare parts maker in Jakarta wider region that already use this QDC die in their production line.

ID 449

Analysis of Production Line Balancing Using Theory of Constraints

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Line balancing is the process of the work station by allocating each work elemen to the work station to a minimum. Line balancing on any production process will affect the number of products produced. Poor production at a work station will cause bottleneck. Therefore, in this study line balancing with five steps Theory of Constraints is a methodology to identify constraints in achieving goals. So that there were constraints that caused the bottleneck work station that the blade was not sharp, the operator ignored the inspection of the roll diameter size and the operator did not dexterously insert the blanket into the machine.From the result obtained the constraints that cause work station bottleneck on work station II, work station III, and work station VI. Where the work station actual is 11, the balance delay value is 63.20%.

ID 467

A Framework to Improve Equipment Effectiveness of Manufacturing Process - A Case Study of Pressing Station of Crude Palm Oil Production, Indonesia

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Overall Equipment Effectiveness (OEE) has been widely used to measure the performance of the production process. A well-performing company is a company that has a high OEE score. Increased the OEE score can be done by minimizing six big losses that greatly affect the score of OEE. In this paper a framework to determine the actions needed to minimize the six big losses is recommended. The framework was then used to determine the action to minimize the six big losses in palm oil mills. A total of 7 actions were required. The highest ranked action, the most important action, was the improvement of raw material quality while the lowest ranked action was to increase the number of workers.

ID 471

Identification criteria and indicators of palm oil industrial solid waste processing technology

Aulia Ishak [1], Amir Yazid Bin Ali [2]
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The palm oil industry continues to grow from year to year. Processing of the palmoil industry into crude palm oil (CPO) and palm kernel oil (PKO). The ratio of the amount of oil produced by both products is 30% of the raw material. This means that 70% is palm oil waste. The amount of palm oil waste will increase in line with the development of the palm oil industry. The amount of waste generated by the palm oil industry if it is not handled properlyand effectively will contribute significantly to environmental damage. Industrial activitiesranging from raw materials to produce products will disrupt the lives of people around the factory. There are many alternative technologies available to process other industries, butproblems that often occur are difficult to implement the most appropriate technology. This paper describes an application of multiple criteria analysis (MCA) in assessing criteria and indicators of palm oil industrial solid and liquid waste. These methods were used in a participatory decision making environment where a team representing various stakeholders and professionals used their expert opinions and judgments in assessing different criteria and indicators (C&I).

ID 189

Formulation of optimization model of raw material composition to achieve clinker quality standards (Case study PT Semen Padang Plant IV)

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Cement making process required four main raw materials, Lime Stone as source of CaCO3, Silica Stone as source of SiO2, Clay as source of Al2O3 and Iron Sand as source of Fe2O3. Proportion of raw materials approximately 80% CaCO3, 15% SiO2, 3% Al2O3 and the remaining 2% for Fe2O3. Due to operational constraints in the mine area, Indarung IV plant is experiencing a shortage of SiO2 source material that is Silica Stone, to anticipate this condition selected Pozzolan as alternative raw material because SiO2 content in Pozzolan is above 60%. This research uses Linier Programming to get formulation model of optimization of raw material

composition with Pozzolan as substitute of Silica stone by minimizing cost. Ash composition factors and calories of fuel are not made into consideration. The results of this study obtained the most optimal raw material composition with minimal cost and meet the standard strength 3 days clinker min. 200 kg / cm2, by inputting the oxide composition of each raw material and the minimum and maximum constrain into the model formulation. The use of Pozzolan as a substitute raw material for Silica increases raw material costs 265,74rp / ton.

ID 512

Chili Sauce Production Planning Model Considering Raw Material Availability: An application of Mixed Integer Linear Programming Method

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PT Bina Usaha Keluarga Sedep Roso is one of agroindustry located in Padang producing chili and soy sauces. Chili and soy sauces main ingredients are sweet potato and black soybean, respectively. Both chili and soy sauces have a broad market in West Sumatera, Indonesia.The problem often faced by companies is that the demand of chili sauce product cannot be fulfilled because of seasonal and perishable factors of the sweet potato. It became scarce and expensive outside the harvest season otherwise the excessive supply and cheap price in the harvest season. This paper proposes an application of mixed integer linear programming to manage production planning of chili sauce to minimize total operational cost and increase the service level consideringraw material availability and production capacity of chili sauce companies. The mixed integer linear programming method is applied because there are some constraints of the problem. The mathematical model is developed to obtain the optimal solution in allocating the available resources with given constraints regarding raw material availability and production capacity. The numerical example is given to illustrate the model and show results. Sensitivity analysis is performed to see the changes of the optimal solution caused by the changes of input parameters of the model.

Room-2	**:**	Ombilin 2
Topics	**:**	Mechanical Engineering
Session Chair	**:**	Prof. Dr.-Ing. Hairul Abrar

ID 435

Analysis of Cracks in the Welded Zone of Stainless Steel Pipe Used in High Pressure Decomposer Equipment

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ASTM A276 was the material used in a stainless steel pipe inside High Pressure Decomposer (HPD) equipment that was being used in the fertilizer industry. The pipe had 3 mm of thickness and was operated at a pressure and temperature of approximately 1.7 MPa and 130^{0}C respectively. Leaking was observed from a crack in a welded area of the Heat Affected Zone (HAZ) and caused the factory to shut down. From the study results, the stress intensity factor (K_I) value at the crack tip was calculated to be approximately $1244\ MPa.m^{1/2}$, whereas the fracture toughness (K_{IC}) of the pipe material value is $499.9\ MPa.m^{1/2}$. It can be inferred that due to the K_I value being higher than the K_{IC} value, then crack propagation occurred in the welded zone until it penetrated through the pipe wall. The cracking was also influenced by the presence of residual stresses and corrosive fluid flowing in the pipe which produced Stress Corrosion Cracking (SCC). It was further found that the welding process used to join the pipe produced porosity defects, which in turn caused porosity coalescence under the pressure of the pipe in operation, allowing crack propagation to occur and penetration of the pipe wall.

ID 482

Thermal characteristics and phase transformation of iron ores containing varied crystalline water with coal mixtures

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Iron ore, with high combined water such as goethite, is widely spread in Indonesia. This is not commonly used as main raw material in iron and steel making process. However, as iron ore resources are getting limited and decreasing in number, iron making industries have to seek other iron ore sources, such as low-grade iron ore goethite ore. This process takes direct reduction method that avoids liquid phase and uses of coal as its reducing agent known as sponge iron. The purpose of this research is to investigate thermal characteristics of composite iron ore containing high combined water, coal, and synthetic goethite ore as comparing samples using thermogravimetric method. This research is conducted with several experimental conditions: heating from 25-1200^{o}C; heating rate 10^{o}C/minute; nitrogen (inert) furnace atmosphere. The composition is divided into two parts, which are composite A and composite B with 24% and 16% coal, respectively. The results showed thatwustite and solid iron formations at temperature of 973^{o}C; 1050^{o}C and 990^{o}C; 1060^{o}C, repectively. This is because there is more coal composition on composite A so that composite B needs higher temperature to produce CO as reducing agent. In general for all mixtures, the reactions occurred from lower temperature are dehydration, dehydroxylation, the formations of Fe_2O_3 (hematite), Fe_3O_4 (magnetite), wustite (FeO), and Fe Metal.

ID 507

Effect of Pouring Temperatures on Porosity and Mechanical Properties of Gravity Die Casting Magnesium Alloy

Is Prima Nanda [1], Muhammad Hafiz Jahare [2], Mohd Hasbullah Idris [2], Bhupal Kumar [2], Mohd Hazwan Hassim [2], Andril Arafat [3,]*

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Gas entrapment and porosities are the two common drawbacks associated with gravity die process. In this study, the effect of gravity die different pouring temperatures at 680, 710, 740, and 780 on die casting material particularly AZ91D mechanical properties namely; tensile strength, yield strength, elongation percentage and porosity percentage were investigated. The result showed that higher strength was obtained at lower pouring temperature. Highest porosity percentage was observed at the areas nearer to riser and lower porosity percentage was obtained nearer the ingate. The highest tensile strength, yield strength, percentage of elongation and less percentage of porosity was obtained for the specimens taken nearer to the ingate which is the starting point of melt entry into cavity.

ID 564
Hydroxyapatite Coating on Titanium Alloy TNTZ using Electrophoretic Deposition

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TNTZ is a β-type titanium alloy that designed for orthopaedic implant application. This material has superiority in mechanical properties such as high strength to work on load bearing or dynamic bearing, elasticity that is close to the human bone, contained non-toxic materials, and biocompatible. However, the inertness of titanium made this material still have no bioactivity, so that it cannot trigger the bone tissue to grow faster and produce optimum osseointegration. Hydroxyapatite (HA) has chosen as the coating material for TNTZ since the biocompatibility and bioactivity of this ceramic material. So that, by combining mechanical properties of TNTZ and bioactivity of HA it can be expected that better orthopaedic implant would be produced. Electrophoretic Deposition (EPD) has chosen as the coating method since the simplicity of the making, relatively low cost, and the ability to coat things with complicated design. In this method, electrical current is used trough cathode and anode within the HA suspension. The electrical potential (voltage) will transport the small particle of HA to be deposited on the surface of TNTZ until producing an even layer of HA coating. This coating process requires two major parameters that are voltage and coating times. The desired quality of HA coating that would produce can be achieved by adjusting these parameters. Voltages are in the range of 7, 10, and 13 volts while coating times are in the range of 7, 10, and 13 minutes. Based on the result it is known that the best HA coating that can be produced are on 10 minutes and 10 volts. This best result shows the good surface morphology, optimum value of mass growth, coating thickness, and surface coverage. Based on this research it can be concluded that increasing voltage and coating times will increase the coating thickness and surface coverage of HA coating. This result shows that the EPD can be used to produce TNTZ titanium implant that coated with HA for orthopaedic application.

ID 508
Mechanical and Degradation Properties of Zink Adopted Magnesium Alloys for Biomedical Application

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The demand for short term degradable implant in bone fixation applications is growing steadily due to aging population worldwide. Degradable implants have the advantage that a second surgery for implant removal is not required. Magnesium is one of the best candidate because of it is biodegradable, physiologically compatible and even stimulates bone reconstruction. However, high degradation rate of pure magnesium in human body fluids may prevent its wider application. In this study, Zinc (Zn) was added in magnesium (Mg) in order to improve its properties. The effects of five different weight percentage of Zinc (2%, 4%, 6%, 8%, 10%) were investigated. The microstructure and mechanical properties evolution of the alloys were characterized and evaluated using optical microscopy, Scanning Electron Microscope (SEM), tensile test and Vickers hardness test, while degradation behaviour was examined using electrochemical corrosion test. The binary Mg-Zn cast alloy with 6 wt. % zinc content (labelled as Mg-6Zn) shows optimum mechanical strength with slowest degradation rate.
Keywords: Mg-Zn alloys; biomedical application; mechanical properties; biodegradation

ID 480
The Effect of Alum Addition on Shrinkage Temperature, Chemical Properties and Morphology in the Manufacture of Vegetable-tanned Leather

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Vegetable-tanned leather has several disadvantages, which one of them is low thermal stability due to insufficient cross-linking with the collagen. The addition of aluminium sulfate in the vegetable tanning process will strengthen the cross-linking between the polyphenol and collagen, as well as forms the matrix in collagen. Thus, it will improve the thermal stability. The research aimed to figure

out the addition of mimosa and aluminium sulfate on the shrinkage temperature, chemical properties, and morphology of leather. The research was conducted by using a variation of mimosa concentration (15%, 20%, 25% w/w) and aluminium sulfate concentration (3%, 6%, 9% w/w). The results showed that the treatment influenced the chemical properties and shrinkage temperature. The optimum treatment was the addition of 9% (w/w) aluminium sulfate to 25% mimosa which resulted to shrinkage temperature of 99,33° (rise 18,34%); nitrogen content (8,00 ± 0,0141)%; raw skins substance content (44,46 ± 0,0778)%; tannin bound content (28,29 ± 0,0424)% and the degree of tannage (62,93 ± 0,0141)%. Based on the SEM image, the addition of aluminium sulfate after mimosa has made the collagen fiber structure to be dense, which indicates the improvement of the cross-linking between the polyphenol and collagen.

Room-3	**:**	Ombilin 1
Topics	**:**	Civil Engineering
Session Chair	**:**	Yossyafra, Ph.D

ID 163
Study of Implementation Traffic Control Zone On Road Works

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Road works are almost always near with moving traffic and potentially causing traffic disruption, congestion, delay, frustration, and more can cause collisions that would injure or kill road users and road workers. In order to remain resilient, the road worker must apply the zone concept on road works. This study aims to evaluate the application of Safety Technical Guidance on Road Work Location conducted by PT. Citra Muda Noer Bersaudara on Road Reconstruction of Junction (Koto Baru) - Jambi Border segment. So do a direct observation of the road work zone implemented by the contractor and compare it with the applicability in the guide. The implementation of the road work zone carried out by the contractor on the work package under review still lacks. In the implementation, the lack of which always occurs in every job implementation is the absence of a termination zone in all types of work, the transition zone is only applied to asphalt work, the early warning zone is only applied to road concrete work, asphalt overlay work and road shoulder work. In addition, a vehicle speed survey is conducted before entering the road work zone and in the work zone. Speed survey results show that the

implementation of road work zone applied by the contractor can reduce the speed of the vehicle.

ID 359

Analytical Network Process (ANP) for Priority Setting of Strategic Roads Handling at Tebo Regency

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Development of transportation infrastructure in the region aims to meet the needs of the community to facilitate mobility of people, goods and services. However, the work of transportation infrastructure requires a large amount of cost while the development budget is limited. Therefore, a careful determination of the priority of road handling is urgently required. In this study, an analysis was conducted to determine the priority of handling strategic roads in Tebo Regency. This study uses the Analytic Network Process (ANP) method with 4 (four) criteria to determine the priority of road handling, namely: engineering, economics, regional potential and policies. It was found that National Road - Pintas being the first priority with a weight of 0.252, then the second priority for National Road - Lubuk Mandarsah with a weight of 0.23.The third priority is Unit I Rimbo Bujang - Unit XI Rimbo Ulu Road with a weight of 0.211.

ID 510

Intersection performance evaluation and designing intersection at concourse between arterial road and ramp of Medan-Kualanamu-Tebing Tinggi highway

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In overcoming congestion problems that occur in Medan-Tebing Tinggi route, especially at certain points such as at Pasar Bengkel and Kayu Besar intersection during peak hours, an infrastructure has been built in, that is ahighway which connecting Medan-Kualanamu-Tebing Tinggi. Medan-Kualanamu-Tebing Tinggi highway (MKTT) will connect Medan City and Tebing Tinggi City, so that drivers from Medan who will go to Tebing Tinggi will not pass through the main road that

is prone to congestion. There is an intersection that connects arterial roads with each MKTT toll gate. At the intersection, there is a conflict between flows from the opposite direction and intersecting, resulting in delays and queuesalong the intersection arm. The conflict occured because of the lack of designing of the intersection that drainsthe flow of vehicles from ramp to arterial road or vice versa. This needs consideration because of the congestion causes queues and delays, especially during peak hours and holidays, so that it requires intersection performance analysis at concourse between arterial road and ramp of Medan-Kualanamu-Tebing Tinggi highway and design the geometric of intersection which appropriate with this intersection. From the results of the evaluation analysis, obtained degree of saturation at the intersection of the arterial road and the ramp of Lubuk Pakam toll road at 0.71 with level of service C that is still feasible to be used, so there is no need to change the intersection geometry. While for Sei Rampah, the degree of intersection saturation is 0.79 with the level of service D, which means that it is not feasible, requiring a change in the geometry of the intersection with a signalized roundabout. With the planned roundabout geometry, the degree of saturation is 0.5 which means it is feasible to use.
Keywords: Intersection performance, Design of Intersection

ID 582

Determining the Priority of New Road Development According to the West Sumatera Provincial Government Perception

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The provincial government of West Sumatra has planned the construction of several provincial roads in order to improve community welfare. In order for the existing budget to be used effectively and appropriate, an analysis is needed to determine the priority of road development. This study aims to determine the order of criteria and priority sequence of roads for the construction of new roads in West Sumatra province. To determine the order of criteria, the Priority Criterion method is used and to determine the priority sequence of the road segment, the Prioritization Matrix method is used. From this study, there are six main criteria that influence the construction of new roads in the province of West Sumatra, namely the criteria "Roads built will support access to local production and trade", criteria "Roads that are built will be an alternative to disaster mitigation", "Roads built are access towards public facilities ", the criteria for the Roads built are access to isolated areas", the criteria "Roads built will shorten the distance between two or more cities.", and the criteria "Roads built are access to natural tourism areas". And from the six criteria, it was concluded that the road that became the main priority was the PasarBaru - Alahan Panjang road segment. The results of this

study can be a reference for decision makers in determining the priority of road development at the PUPR Department of West Sumatra Province.

ID 553
Sensitivity Analysis of Stormpav Composite Pavement

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This study investigates the design and performance of modified composite pavement called StormPav. In this study, the sensitivity analysis is carried out by using available freeware to prove whether the StormPav composite pavement is able to provide long-life pavement and better levels of performance, both structural and functionally, than the traditional pavements. For this case, the sensitivity analysis is included data for fatigue behavior, rutting in the HMA (Hot Mix Asphalt) layer, and temperature gradient reduction of PCC slab with an HMA overlay. The StormPav composite pavement is actually an innovation IBS green pavement with structural, environment and economic advantages. Inspired from Legos concept, the StormPav is made out of modular panels or "road blocks" that are like enormous lego pieces that assemble and interlocking together forming a uniform settlement and at the same time acting as monolithic character. The idea of StormPav is actually to minimize the usage of material in composite pavement but provide the same strength and benefits as composite pavement.

ID 654 Marshall Immersion Test of Warm Mix Asphalt Polymer Using Bayat Natural Zeolite

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The development of increasingly dense traffic and weather changes greatly affect the quality of the pavement which could cause premature damage. Elastomeric polymer modified asphalt is used to reduce the early damage and increase the durability of pavement to various damage such as fatigue, cracking due to temperature changes. All this time polymer asphalt mixing is using hot mix asphalt

metode. According to the name the hot mixing asphalt requires heating at a certain temperature which is quite high on the Asphalt Mixing Plant (AMP), also requires a certain density. Some countries have developed asphalt mixture known as Warm Mix Asphalt by mix temperatures and compaction temperatures lower than hot asphalt mixtures using added material. Research using experimental methods with elastomeric polymer bitumen as a binder in the warm mix asphalt with the added material of natural zeolite, thus obtained mixture quality hot asphalt mixture equivalent but processed by low mixing and compaction temperatures. Based on Marshall test asphalt polymer with zeolite content of 1.5% of natural zeolite sieve no. 400, has the highest stability values 1627,7 kg, has the residual stability value of 93,36%. The value of residual stability meet the specifications Department of Publik Work of Highways, 2010, indicating that the residual stability the warm mix asphalt with 1.5% bayat natural zeolite is high and the water resistance is very good.

Room-4	**:**	Kuantan 1
Topics	**:**	Electrical Engineering
Session Chair	**:**	Prof. Dr. Eng. Ariadi Hazmi

ID 428

Design and Implementation of Microstrip Patch Ultra-wide Band Antenna for Detection of UHF Partial Discharge

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Partial discharge (PD) is an electrical release or spark that occurs between two conducting electrodes that are not bridging, and it can occur at any points in the insulation system. PDs emit electromagnetic field radiation in the frequency range of 300 MHz to 1.5 GHz. Thus, it is more appropriate to detect and monitor partial discharge using an ultra-wideband antenna which offers more accuracy than the narrowband antenna. This paper proposes the design and implementation of a microstrip patch antenna which has been designed to possess wider detection performance of ultra-high frequency (UHF) PD signal. The PD spectra of the

designed UWB antenna and the commercial whip antenna was compared and analysed. The result shows that the UWB antenna can effectively detect the UHF PD signals that occur between two electrodes. As results, it is implied that PD measurement by using designed UWB antenna is found to suitable to detect the PD signals for online monitoring of high voltage equipment.

ID 433
Overcurrent Relay Coordination with Grid-Connected and Islanding Capability on Distribution Network with Distributed Generation

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Islanding operation of distributed generation become more appealing since large numbers of distributed generation have been installed worldwide. However, protection schemefor islanding condition is one factor that hinders the realization. Therefore, this paper proposes a method to establish overcurrent relay settings that coordinate correctly for both islanding and grid connected. The method tries to find compromise between the setting of grid connected and grid disconnected condition. The results of a case study shows that settings for islanding condition provide correct coordination of the standard invers overcurrent relays for both grid connected and islanding condition.

ID 660
Modification of Arm Patch of Double Layer Printed Antenna for Partial Discharge Detection

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Partial discharge is a local electrification phenomenon that partially connects the insulation between the conductors and occurs either on the surface of the conductor or inside the conductor (void). PD generates several phenomena that accompany the occurrence of PD, such as impulse currents, hot light radiation, electromagnetic waves, mechanical waves and chemical processes. This phenomenon is captured to know the existence of PD. One of the PD measurements

uses the UHF method ie, by measuring the waves generated by the partial discharge. Antenna is one form of antenna developed from a square micro strip antenna with symmetrical T-shaped tethering. Antenna parameters can result in changes in return loss and VSWR measurements. The parameter change is done on three parameters i.e. (A, B and G) showing the difference to the reference antenna. The experimental results show a change in antenna bandwidth.

ID 558

Development of HFCT sensor for partial discharge sensors

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This paper presents partial discharge (PD) measurement techniques using a commercial sensor, High Frequency Current Transformer (HFCT). An Output signal from HFCT is read by a digital oscilloscope and compared with a reading in PD detector. When the PD occurs, output sensor detected using high impedance has a long time of oscillations, thus interfering the next reading of the values. To avoid this issue, time of oscillations must be reduced by installing a damper which is a resistor connected in parallel between the sensor and the oscilloscope. The result of the measurement shows that the damper is optimum when it has the same reading on peak values as read by the PD detector.

ID 661

Design and Testing of Trapezoid Log Periodic Antenna for Partial Discharge Detection

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Insulation system is the most important part in power apparatus. The failure of power apparatus is usually caused by the failure of the insulation system. The failure of the insulation system is usually initiated by partial discharge in the insulation. Therefore, the condition of power apparatus may be monitored by detecting partial discharge in the insulation system. Partial discharge generates physical phenomena such as electromagnetic wave. The detection of partial discharge may be conducted by detecting electromagnetic wave induced by partial discharge using sensor and antenna. This paper discusses the design of trapezoid log periodic antenna for partial discharge detection. The antenna criteria was determined and the size and the parameters of antenna were calculated. The antenna was simulated using antenna simulator to obtain return loss and the bandwidth of the antenna. Then, the best antenna design was printed and tested using the network analyzer. The detection quality is determined by the number of partial discharge pulse, partial discharge charge and magnitude produced by the partial discharge source in a cycle of applied voltage.

ID 534

Partial Discharge Pulses Characteristics of LDPE-NR Bionanopolymeras The Electrical Insulation under AC Voltage

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The dielectric properties of LDPE-NR biopolymeric insulation materials can be improved by adding the alumina nanoparticles in a certain percentage weight into the composite. In the present study, four types of bionanopolymeric samples were prepared. To each sample, the nanoalumina particles with a weight percentage of 1.5%, 3%, 4.5% and 6% a were added. To see the electrical characteristics, the effect of the electric field on the material has been tested for 1 hour. However, several factors can affect the performance of polymer materials, one of which is a defect. For several studies conducted by previous researchers, partial discharge analysis needs to be done to diagnose the degradation rate of bio-composite composites with the addition of other fillers, such as alumina. Alumina is one type of filler that has high electrical resistance and is resistant to thermal shock and corrosion.

Room-5	**:**	Kuantan 2
Topics	**:**	Electrical Engineering
Session Chair	**:**	Dr. Eng. Ilhamdi Rusydi

ID 514

Real Time Condition Monitoring System of Gapless Arrester Based on ZigBee Protocol and Third Harmonic Leakage Current as Indicator Parameters

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Monitoring the condition of arrester in service have been presented in the past. Several methods of monitoring the condition of surge arrester were introduced by many researchers. Some and almost all the methods are based on measuring the leakage current. The goal of this study was to design a portable arrester condition monitoring system which is capable of performing arrester health analysis without the need for a voltage source reference. The design based on the previous research which introduces the new method to discriminant the resistive leakage current from total leakage current. The method for diagnosing arrester health is only with the leakage current waveform. The advantage of not needing the voltage refference is that the system can ultimately be used in the field where acess a voltage reference about 150 kV is not practical. The design employs a ZigBee wireless protocol as well as microprocessing based system utilizing an Arduino microcontroller. The ground side current from the arrester is fed through a resistor, which can then be used as a readable voltage.LabVIEWbased graphical user interface was createdto analyse an arrester's data. The user connects the GUI to the Arduino via ZigBee, samples the waveform from an arrester and then additional data processing is executed. The main part of this processing involves the modified shifted current method on the sampled waveform. Upon conclusion, the user is left with only the resistive component of the arrester leakage current, which is displayed in both the time and frequency domains for analysis.

ID 515

Condition Based Monitoring of Gapless SurgeArrester Using Electrical and Thermal Parameters

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A new method to assess the condition of metal-oxide surge arresters is presented. The thermal image and third harmonic leakage current is used as an indicator. The linear relationship between the leakage current and temperature of arrester is processed using neural network. The temperature profile of arrester, ambient temperature and humadity as input to neural network and the peak value of the third harmonic resistive current as target. Results are presented the training of neural network close to the target and testing result is 98% succesfully.

ID 535

The Tensile Properties of Alumina dan Silica Bionanocomposite Material for High Voltage Insulation

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The dielectric properties of LDPE-NR biopolymeric insulation materials can be improved by adding the alumina nanoparticles in a certain percentage weight into the composite. In the present study, two sets of bionanopolymeric alumina and bionanopolymeric silica content samples were prepared. To each sample, the nanoalumina particles with a weight percentage of 1.5%, 3%, 4.5% and 6% a were added. To investigate the effect of nanoalumina and nanosilica filler to the mechanical properties of the nanocomposites material, the tensile test was carried out. The results show that values of the tensile reduce that linearly for both sets of sample with the increasing of weight percentage of nanofillers.

ID 516

Power Loss Estimation of Polymeric Housing Surge Arrester using Leakage Current and Temperature Approach

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The good operation of metal oxide surge arresters depends on increment of temperature. If the arresters cannot quickly disperse the absorbed energy into the ambient, arresters temperature exceeds its operating temperature limit. Consequently thermal runaway occurs and results power loss. In this paper, thermal characteristics and thermal stability based on power loss calculation was investigate. Applied voltages, leakage current, and temperature were main parameters consideration. The power loss calculated by the electrical model is the input to the thermal model. The electro-thermal model is used to determine the two inter section points (stable operating point and the thermal in stability point) of the power input and heat loss curves. The results show that irrespective of the magnitude different voltages applied to the arrester and different energy ratings for the elements, the powerloss occurs at certain applied voltage.

ID 580

Morphological Characteristics of Preliminary Breakdown Pulses of Hybrid Intra Cloud–Negative Cloud-to-Ground Lightning at Low Lattitude

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Preliminary breakdown (PB) pulses can represent the propagation path of lightning initiation and can be used to model the charge structure of a thundercloud. The characteristics of PB pulses from the lightning initiation process depend on the charge structure of the lightning cloud. This study presents the PB pulse morphology and charge structure of thunderclouds from hybrid intracloud–negative cloud-to-ground (hybrid IC-NCG) lightning in Padang, Indonesia. PB pulses were obtained from lightning radiation electric field observation. A total of 41 PB pulse waveforms of hybrid IC-NGC flashes were analyzed. Three types of PB pulse characteristics occurred in association with three different types of hybrid

IC-NCG lightning morphologies. Hybrid IC-NCG lightningcan be initiated from the main negative cloud chargeto the upper positive cloud charge or vise versa. The propagation direction of the initial PB pulse train of hybrid IC-NCG flashes is either upward or downward.

ID 611
Characteristics of acoustic signals from lightning using a microphone array observation system

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The acoustic signals of thunder provide information on the lightning channel, such as frequency, power spectra density, and images. In this study, to analyze the frequency variation in acoustic signals of thunder and to reconstruct the3D lightning channel imaging, the short time Fourier transform (STFT) and differential time of arrival (DTOA) methods were used. The results showed that the frequency for four microphones varied from 4.88 Hz to 175.78 Hz. Furthermore, the range of power spectra density values for the four microphones was between -0.59 dB/Hz and -28.31 dB/Hz. This system is able to reconstruct 3D lightning channel imaging.

Room-6	**:**	Arau
Topics	**:**	Environmental Engineering
Session Chair	**:**	Dr. Eng. Slamet Raharjo

ID 479
The Use of Protein Binder from Shaving Waste for Leather Finishing: Judging from The Physical, Chemical, and Morphological Properties of Lizard Skin Leather

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Shaving waste is the tanned leather shavings produced by the leather tanning industry. This waste is very polluting the environment because it contains

chromium, is difficult to degrade, volume is large and light, so it is difficult to handle for the leather tanning industry. The purpose of this study is to deal with the problem of shaving waste which is very polluting the environment and how it affects the use of protein binders made from the shaving waste to the test results of the physical, chemical, and morphological properties of the skin. The shaving waste was hydrolyzed using NaOH and separated by filtering the results of the hydrolysis. Filter results were tested as protein binders and used for lizard skin finishing. The lizard skin is then finalized with a variation of binder 1:1; 1:3; and 1:5. Then the skin was tested physically, chemically, and morphologically. The results of the organoleptic test showed that all variations were almost the same and met requirement of Indonesian Standard (SNI 06 - 4568 – 1998) about the quality of chrome-tanned. For the physical properties, all parameters met the requirement of SNI, except for elongation. Chemical tests properties showed that all of the parameters met the requirement. From the SEM test, it is showed that the greater the ratio between the protein and water binders, the smoother of the morphology of the surface.
Keywords: binder, finishing, hydrolysis, influence, and shaving

ID 483

Food Packaging Development of Bioplastic From Basic Waste of Cassava Peel (Manihotuttilisima) and Shrimp Shell

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Development of biodegradable plastics or bioplastics that can be degraded by microorganisms such as bacteria and fungi is one approach to solving the problem of plastic waste. Bioplastic from waste starch and cassava peel shrimp shell waste as filler or reinforcement that has been generated in previous research. This research aims to develop bioplastic packaging into food for direct consumption and packaging. Stages of the study include the manufacture of bio plastics, food safety testing, manufacture and packaging of food products, organoleptic test, and the test period. Utilization of cassava and leather waste shrimp shells for bioplastic packaging is an added value in addressing environmental problems because it is recycled into products of high economic value and environmental.

ID 617

Preliminary Study of Solid Waste Management of Tourist Area in Pariaman City

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This study aims to measure and analyze the data of solid waste generation, composition and recycling potential of the tourism area of Pariaman City. Sampling and determination of samples based on SNI 19-3964-1994. Sampling location was on 3 beaches in Pariaman City were Gandoriah Beach, Cermin Beach, and Kata Beach. The results showed that the average unit of solid waste generation was 0.033 kg/person/day or 0.344 liter/person/ day. The largest component of the waste was the organic waste by 90.79%, while inorganic waste by 9.21%. Recycling potential consists of paper19.231%, plastic 93.359%, glass 64.505%, non-ferrous metal 95.072%, wood 16.408%, and food waste 36.787%. It was recommended that this solid waste could treated onsite through development of solid waste treatment station with 3R bases (3R-SWTS) that applied composting technology to treat the garbage, cleaning and packing the rubbish, and utilizing the waste that has value to produce creative product for supporting the tourism activity such as souvenirs, while the rests should be transported into the landfill site.

ID 628

The Effect of Additional Vegetables and Fruits Waste on The Quality of Compost of Cassava Chip Industry Solid Waste on Takakura Composter

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This study aims to determine the optimum raw material composition on an aerobic composting method using takakura composter. Each variation was tested for maturity and quality of compost then compared with SNI 19-7030-2004 on macro element parameters. This research mixes raw materials, namely solid cassava chips industrial waste in the form of cassava peel and domestic organic waste in the form of vegetable and fruit waste from the homes of local residents around the cassava factory and the addition of EM4 bio-activator. The raw materials used are Cassava Peel (CP) and Vegetables Fruits Waste (VFW) and additional EM4 as bio-activator. The composter used has a capacity of 5 kg as many as 7 units with 7

variations, namely variation 1 (100% CP), variation 2 (100% CP; EM4), variation 3 (90% CP; 10% VFW; EM4); variation 4 (80% CP; 20% VFW; EM4), variation 5 (70% CP; 30% VFW; EM4), variation 6 (60% CP; 40% VFW; EM4), and variation 7 (50% CP; 50% VFW; EM4). The results showed that all composters had met the standards in accordance with the compost standards used in Indonesia, namely the SNI 19-7030-2004 standard on compost specifications from domestic organic waste. The quantity of compost produced in this study was 1.0-1.5 kg where variation 6 produced the most compost quantity as 1.5 kg. The optimum dosage for composting was assessed from the highest scoring system was variation 6 with a mixture of 60% CP; 40% VFW; EM4 with a score of 24 and composting time for 7 days.

ID 505

Minimization of Household Hazardous Solid Waste (HHSW) with 4R Concepts (Reduce, Reuse, Recycle and Recovery) in Padang City, Indonesia

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Improper management of hazardous waste originating from household activities will potentially pose a threat to health and the environment. Management of hazardous waste includes minimization activities and hazardous waste treatment. This study aims to analyze the existing conditions and potential minimization of Household Hazardous Solid Waste (HHSW) with the 4R concept, namely Reduce, Reuse, Recycle and Recovery in Padang City. HHSW minimization data was obtained through the analysis of questionnaire data distributed to several HHSW generation sources in Padang City, while the minimization potential was obtained from the existing literature review. The minimization of the existing HHSW was 17.4% (2,067 kg/day) from the total HHSW generation in Padang City. This minimization activity consisted of 11.6% reduce activities, 2.2% reuse activities and 3.6%recycle activities. From the calculation and literature study, the potential of minimizing HHSW was 51.2% (6,081 kg/day) which consists of 11.6% reduce potentialin the form of large volumes of HHSW packaging purchases, 18.7%reuse potential through the return of product packaging to producers in the Environmental Producer Responsibility (EPR) program, 13.2% recycle potential in the form of oil can recycling, bulbs and cartridges, and 7.7% recovery potential by recovering metal content in batteries and car battery.

ID 539

Greenhouse Knockdown in Merauke

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The use of Greenhouse in crop cultivation is one way to provide an environment that is closer to the optimum conditions for plant growth or commonly referred to as the method of cultivation of plants in a controlled environment (Controlled Environment Agriculture). In Merauke Papua the farming method is still conventional (still following the climate), so that production is not maximized throughout the year. The purpose of this study is to build a household scale greenhouse that can be assembled. This research is an experimental and Action Research, the research phase is among others; 1) Knockdown greenhouse design, 2) making greenhouses, 3) greenhouse testing (transporting, assembling and installing and clearing). The results of the knockdown greenhouse structure research using a combination of iron pipe and hollow iron, the application is on the column pole / column using a 3 inch diameter iron pipe while for the roof and wall frame using 4 cm hollow iron 3 mm thickness. for foundations using pedestal / local foundations with a total of 18 foundations with dimensions of 27,000 m3 (30 cm x 30 cm x 30 cm). The knockdown greenhouse roof consists of 2, namely; 1). the roof top uses used bottle roof cover material, 2). the lower roof uses the Paranet / insect screen roof cover material. The installation and dismantling of the knockdown Greenhouse takes + 2 hours 30 minutes, with time division: 1). + 45.40 minutes installer for greenhouse structure; 2). 35 minutes installation of roof cover (used bottles) and; 3). 50 minutes installation of the insect screen.The first section in your paper.

Parallel Sessions II

Date : November 8, 2018 (Thursday)

Time : 15.30 – 17.00

Room-1	**:**	Sumpur
Topics	**:**	Industrial Engineering
Session Chair	**:**	Jonrinaldi, Ph.D

ID 477

A system for improving evaluation suppliers: the case of procurement in education institution (case study: Andalas University)

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In the current era of globalization, it is imperative for any organization to innovate in an effort to improve efficiency to solve a problem. Supplier selection is one of the problems in the organization of both profit and nonprofit organizations that need to be resolved efficiently. One of the nonprofit organizations is college. The college aims to produce human resources / graduates who are able to blend and help people's lives. One of the factors that affect the quality of graduates is the availability of facilities and infrastructure in supporting the learning process in universities. To obtain the quality of facilities and good infrastructure, it is necessary procurement process by involving a good supplier selection process. One way to get a good supplier is by using Decision Support System (DSS). DSS is one of the most useful studies to help the supplier selection process efficiently. DSS design is done by integrating the database design and calculation model and information model packed in an attractive user interface (UI). The design of DSS conducted in this study using database design on several college faculties. The database design is used not only on the criteria and rating database, but also consists of suppliers, inventory data, job listings and supplier assessment details. Model design is provided by combining the Likert scale method for determining the criteria and TOPSIS method for the supplier ranking process based on user ratings. Assessment is given by 2 assessment teams. In addition, the design of the information model is provided by developing the information model of the current procurement process. While the UI design is provided with an attractive appearance and easy to understand (user friendly). UI Display also provides

Knowledge Management as a support supplier assessment. The design results obtained are not fixed on supplier sorting process, but also capable of displaying supplier data information, work done, inventory management and detailed assessment as well as supporting decision makers in selecting suppliers. In addition, the results obtained after applying the DSS design on one of the faculty of higher education, it is increasing the effectiveness and efficiency in terms of time and supplier selection process. DSS design can shorten supplier selection process from a minimum of 5 days to real time.
Keywords: Supplier Selection, Decision Support System, Likert Scale Method, TOPSIS Method

ID 465
Investigation of Gender Influence on Behavioral Intention towards the Use Behavior of Mobile Internet Technology

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Mobile internet is a popular mean used by a majority of people in the world that enable them to access the internet wherever and whenever they are. The acceptance of mobile internet by individuals contributes a critical aspect to the success of mobile internet use. Previous studies in other countries confirmed that there was significant influence between gender on the acceptance of the mobile internet. By using Unified Theory of Acceptance and Use of Technology (UTAUT) and its model development, a study was conducted in order to find out the influence of gender on factors influencing behavioural intention towards the use behavior of mobile internet technology in Indonesia. Data were collected by involving 271 students of Telkom University as the participants. The data were then analyzed by using Structural Equation Modeling approach. The result showed that there was the influence of gender related to the factors including social influence, facilitating condition, and perceived flexibility on behavioral intention towards the use behavior of mobile internet technology. Besides, the results of this study showed differences in factors affecting mobile internet usage between male and female. The results of the research are expected to give a contribution to all practitioners and researchers in the field of mobile internet and technology acceptance.

ID 478

The role of dams on water, food and energy security issues: A global review and resolution for Indonesia

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Increased water, food and energy demand due to population growth has contributed linearly to the increasing focus of world concern on dams in many countries. Lately, dams have become an important issue in sustainable water resources management, which have been used for various purposes such as flood control, industrial water supply, irrigation, fisheries, recreation, navigation, hydroelectricity and and other purposes. This study aims to analyze the relationships between variables related to world's water, food and energy issues, including dams. Multiple linear regression analysis was used to identify the significance of interrelated relationships between variables of water consumption, energy consumption, irrigated areas and number of dams based on period 1960-2010 data. The results of the analysis concluded that water consumption had the most significant effect on energy consumption and the number of dams. Meanwhile, the number of dams has a significant effect on water consumption, followed by energy consumption. As a resolution for Indonesia, which currently focuses on food and energy security issues, this study recommends that the construction of dams (including large dams) be accelerated.
Keywords: Dams, Energy, Food Security, Irrigation, Water.

ID 645

Waste assessment using lean approach in receiving process of container terminal: a case of Teluk Bayur port

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This paper aims to assess wastes in receiving process of container terminal using lean approach at Teluk Bayur port. It begins with developing the Value Stream Mapping (VSM) of receiving process of container terminal in Teluk Bayur port.

Value Added Assessment (VAA) is then used to identify the wastes that classified into Value Added (VA), Non Value Added (NVA), or Necessary but Non Value Added (NNVA). Finally, Failure Mode and Effect Analysis (FMEA) is applied to evaluate the failure modes of wastes and develop the proposed improvements. Through VSM stage, it is identified eight processes with a total of 28 activities in receiving process of container terminal in Teluk Bayur port. The results of VAA show there are a total of 14 non value activities consist of nine NVA activities and five NNVA activities. In FMEA, it is obtained four failure modes with highest Risk Priority Number (RPN) related to failed in open stack process, machine problems, failed to manage documents of receiving card and system crashes. It is suggested to update the information in website and notice board, perform regular maintenance to machines, upgrade the machines, provide the proper information of receiving process procedure, conduct routine maintenance to website, and provide generator engines. This study is hoped can assist the Teluk Bayur port to improve their performance.

ID 426

Bankruptcy Prediction of Listed Cement Company in Indonesian Stock Exchanges Using Altman Z-Score Model

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Ratio analysis is one of the most competent tools to predict the bankruptcy of a company. In this paper the bankruptcy prediction of listed cement company in Indonesian Stock Exchanges has been evaluated using Altman Z-score. This study aims to determine the level of the bankruptcy of the listed cement companies in the Indonesian Stock Exchange during 2013 to 2017. There are four listed cement companies, namely PT Semen Indonesia Tbk. (SMGR), PT Semen Baturaja Tbk. (SMBR), PT Indocement Tunggal Prakarsa Tbk. (INTP) and PT Holcim Indonesia Tbk. (SMCB). Based on the results of the research, it shows that PT Semen Indonesia Tbk. (SMGR), PT Semen Baturaja Tbk. (SMBR) and PT Indocement Tunggal Prakarsa Tbk. (INTP) are in the safe zone with the highest Z value which is 15,822 and the lowest Z value which is 3,542. PT Holcim Indonesia Tbk. (SMCB) is in the bankrupt zone because it has a Z value below 1.8. For that reason, all companies need to improve the performance immediately to avoid the bankruptcy happening. There are many ways to avoid the bankruptcy such as improving the sales revenue with stronger sales team, improving operational cost by improving productivity and waste reduction in operation. Lastly the

most important thing is the leadership team have to come out with clear objectives and strategic action of how to get out from the bankruptcy zone.

ID 498
The Impact of Strategy Planning on Small Medium Enterprise Performance in West Sumatera

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The development of the industrial sector in urban areas is very important. Rapid growth of the industrial sector will stimulate the growth of other sectors and will served as the raw material provider for the industrial sector. Small and medium industries have a central and strategic role in the development of people's economy. The industrial system currently has a lot of progress that makes emergence of intense competition between companies. To preparethe tight competition, the company should have a good strategic planning in realizing the goals of the company for the future. The food industry is very important because it relates to the main human needs. Strategic planning is generally used by large companies to improve company performance, but the strategic planning for small and medium Industries also has a relation with the company performance. This project using 40 samples include all of the industry product food in Padang City, the process of this research is using the PLS method and was helped by software Smart-PLS version 3. The conclusion of this research are using three indicators such as leadership, environmental and organization culture. The organization culture was the highest indicator that madeup the best strategic planning. Its 39% that influenced the strategic planning.After that, the indicator of environmental and leadership can influence the strategic planning. Output of the t-statistic and says that the original sample have the influence strategic planning for the performance of the company's such as operational or financial performance influence performance and this is significant. This influence had the height percentage, such as the strategic planning have 50.6% to influence the financial performance, and for operational performance have 59.2%.

Room-2	**:**	Ombilin 2
Topics	**:**	Mechanical Engineering
Session Chair	**:**	Firman Ridwan, Ph.D

ID 462
The Determination of Workspace and the Performance Evaluation of PRoM-120 with 3 and 4 Kinematic Constants

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This paper presented a parallel robotic manipulator having combined DOF, i.e. one translational and tworotational DOF, called PRoM-120. PRoM-120 is constructed by using 2PRU/PRS kinematic chains (KCs) and arranged in an asymmetric way. The objective of the research is to determine the workspace and evaluate the performance of PRoM-120 using three cases that are the numerical value of its kinematic constants. The workspace is calculated by applying the discretization method. The inverse kinematic solution, direct singularity, inverse singularity and actuators limit are taken as the significant factor to determine the workspace. Meanwhile, the performance of PRoM-120 is evaluated by applying conditioning index and transmission based index. It shows the conditioning index cannot be used for PRoM-120, or parallel manipulator having combined DOF. Assessing the performance of PRoM-120 using transmission based index exposes only less than 20% of the workspace be in the good transmission workspace.

ID 550
Natural Frequencies of Twisted Cantilever Beam

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This research is conducted to determine the natural frequencies of a twisted beam with different orientation of principle axes numerically using Autodesk Inventor. Further, the results are compared experimentally. In order to simplify in analysis, the twisted cantilever beam is divided into two segments model.The orientation between two segments is simulated and tested variously. The natural frequencies obtained numerically dan experimentally are selected only in transverse vibration based on the simulation of each mode shape of the cantilevered beam. In general,

the natural frequencies of the simulated cantilever beam and experiment results tend to similar results.

ID 592

The Development of Two Wheel Mobil Robot : Generated path using simulation and Actual Path of Mobile Robot are Compared

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There are several ways to guide a wheeled mobile robot on the floor. One way is to mount the mobile robot on a rail, so that the mobile robot can follow the rail and its movement is controlled by a controller. Another method is by using colour mark sensors. The sensors are used to detect the line on the floor thus guiding the robot along it. An autonomous mobile robot uses images from a camera to recognize the obstacle ahead and compute the best path to follow and avoid obstacles. But this type of system is expensive and image processing takes time. The best method from the previuos paper is proposed in which a predetermined path is derived from simulation. The robot movement is programmed on a simulated bordered floor, and its path is optimized before the program is downloaded to the mobile robot. This paper describes the development of a two wheel mobile robot. The kinematics and dynamic model of the robot are developed and simulated. The simulation program was developed in MATLAB. Finally, the experiment is conducted to compare the differences between the simulated path and the actual path.

ID 594

Experimental Evaluation of Tuned Liquid Column Damper and Tuned Mass Damper in a Space Structure Model

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Vibrations in building structure due to external force can be minimalized by absorber installation. One of technique in that regard is through dynamic absorber. Previous reports have developed double dynamic vibration absorber namely Tuned Liquid Column Damper (TLCD) and spring mass system. However, the conduct has been applied to reduce vibrations occurred on solely one-sided

movement. This study investigated the double dynamics absorber utilization of Tuned Liquid Column Damper (TLCD) and spring mass system that were designed to be capable of vibration reduction caused by interfering forces on two-sided structures hence the implementation can be more applicative.

ID 629
Numerical Analysis of U-Shaped Hysterisis Steel Damper with Energy Absorber for Seismic Areas

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This paper investigates one type of metallic dampers used in many large buildings in seismic areas. There are two different characteristics that want to be introduced to the damper. First, the damper should be able to restore a large displacement of structure due to heavy load, and the second, the damper should be able to absorb a seismic energy through a yielding of uncritical part inside of the damper. The previous studies have shown a possibility of the introduced damper to act as a damper as well as energy absorber through yielding on U-plate of the damper. However, U-plate is considered as the one of critical parts in this system. To avoid this condition, the current study aims to substitute this critical area to another part which is considerably uncritical during loading. Therefore, in this paper, an additional part in form of slender column is inserted into damper. The bottom part of the column is clamped to the base plate of the damper, consequently there is a restoring moment acting on the column. This restoring moment is considered able to restore a large displacement of damper. If yielding occured, the damage can be initially localized in slender column, before reaching the U-plate. A stiffness, strength and energy dissipation of the modified damper are determined by a nonlinear finite element technique which involves both geometrically and materially nonlinearities. The model was subjected by a monotonic increasing load which is applied horizontally through method of displacement control until one cycle of hysteresis is formed. The final result is in a term of comparison of hysterisis curves between a full model of hysterisis damper with and without a slender column.

ID 652

The Potential of rise husk fibre/native sago starchreinforced bio compositeto automotive component

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The aim of this work is to examine the mechanical and thermal behaviour of rise husk fibre/starch reinforced epoxy polymer composites. Experiments are carried out to study the effect of fiber and filler volume percentage on mechanical, and thermal behaviour of epoxy based polymer composites. The volume of fibre and filler is varied by 10%, 20%, 30%, 40%, and starch 5% and 10% and 1.5%, respectively. The specimens are fabricated by using hand layup technique. The specimens are expurgated according to ASTM standards. The effects of rise husk fibre and filler were examined under different thermal conditions. The mechanical results show that the addition of fibre increased the impack characters of epoxy resin, whereas the addition of starch shell filler increased termal conductivity of the composite. We found that the results show that the stacking sequences of rise Husk/starch fibers have a significant impact on thermal conductivity. Composites with the stacking sequence mode RH40 with 15% starch exhibit the highest thermal conductivity 2.6 W/m·K an enhancement of 472,72% over the thermal conductivity of the PC resin (0.55 W/m·K) it is significant.

Room-3	**:**	Ombilin 1
Topics	**:**	Mechanical Engineering
Session Chair	**:**	Dr. Eng. Eka Satria

ID 484

Design Analysis of the Spur Gear of Perpetual Motion Machine

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This paper analyze the perpetual motion machine design for electric power generation, which is use the spur gear pair in the imbalance position with addition of a mechanism that aims to supply energy to the system, which is termed as "semi-perpetual motion". It is expected that external (mass) energy addition, the system will move continuously so that the shaft rotation (kinetic energy) obtained

can be utilized to drive the generator of electrical energy. Based on the results of system testing, it can be concluded that the system built still needs improvement, especially on the factors that work on the components of interconnected gears. The expected torque to provide a tangential force does not occur so that the system does not produce the mechanical energy of the shaft.

ID 532

Effect of garlic oil as lubricant additive into coconut and palm oils on the physical and tribological properties

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Palm and coconut oils has used as an alternative source of biolubricant that is environtment-friendly and biodegradable lubrication to replace petroleum oil. Due to lack of physical and tribological properties of biolubricant, addition of environmentally friendly additive can increase their lubricant properties. Effect of addition of garlic oil as additive in coconut and palm oils on the physical and tribological properties was investigated and discussed. Oil treatment (OT) was used as comparison which is known as conventional additive contained ZDDP. The results obtained from physical tribological test showed that the addition of garlic oil into coconut and palm oils had changed physical properties of these oils.Pinondisc test and ball bearing wear apparatus were conducted to study tribological properties of lubricant additives into coconut and palm oils. The addition with 5 wt% of garlic oil into palmoil showed significantly improvement in both wear and coefficient of friction.The lubricant was worked very well on mixed lubrication regime stated by smooth surface texture of inner race of bearings. Even though, the results were not as good as OT, garlic oil could be an alternative as environment-friendly additive.

ID 647

The Effect of Solar Water Heater Performance by Variation of Plate Shaped

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Heat is one of the energies that is needed in daily activities. Heat energy can obtain from the sun, in this case, is called solar energy which is widely used in industrial and household application. The vital component of a solar water heater system is a solar energy collector which is also known as a heat absorber unit. Solar collectors or heat absorbers can convert from solar radiation energy into thermal energy. So the aims of this study to experiment the increasing of water temperature caused by the variation of the solar water heater collector plate. The methodology of this experiment has variated the shape of the plate absorber from the flat plate collector named as plate collector A (quadrangle-folded), and a flat plate collector called as B plate collector B (triangle-folded). The collector uses a stainless steel plate with a dimension of 1.5 × 0.8 m where each collector has a variety of plate folded. Fluid flowed through a 1 inch (diameter) copper pipe with 1.4 m of length and isolated using rubber to minimize wasted heat. The results show that flat plate collector B has a higher efficiency compared to the flat plate collector A. The highest of fluid output temperature found in collector B at 67 oC and a solar intensity is 1198 W/m2. The highest useful energy is 209.91 Watts at 13.30 WIB (western Indonesia time), and the highest efficiency is 16.23% at 13.00 WIB (in collector B).

ID 653

The Effect of Particle Compositions on the Activation Energy of PA6/Bagasse Composite

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The Activation energy of PA6/Bagasse particles blends was evaluated as a function of particle compositions. The composite were prepared in compositions of weight %PA6/% weight Bagasse particles, that is 98/2, 95/5, 92.5/7.5, 90/10 and 87.5/12.5 respectively using a twin screw extrude at 40 rpm and 220 OC blending temperature. The Activation energy are determined based on rheological testing with using a capillary rheometer on constant heating method. In this test, it is obtained the relationship of viscosity and temperature of melting composite. Arrhenius linear plot between viscosity to 1/T. can be obtained the activation energy. Particle composition affects the activation energy, the lowest activation energy in the composition of 2% particles and the highest in the composition of 12.5% particles.

ID 648

The Experimental Performance of Semi-Cylindrical Type of Concentrator Solar Collector on the Addition of Heat Storage Material

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The heat absorbability and the efficiency of water heaters are increased by adding phase change material as heat storage in solar water heaters known as cylindrical through collectors type. It used to absorb heat from solar energy and will concentrate towards an absorber pipe containing water, so it can increase the water temperature that flows through the tube. In this study, two absorber copper pipes used with Ø 2.54 and Ø 1.91 cm, respectively. The copper pipes arranged parallel and placed the heat storage materials with different conditions. A drum with a diameter of 55.5 cm and a length of 10 cm is split vertically into two parts which will be used as a cylindrical type of solar collector. The solar intensity measured during the experiment. Results show the highest water out temperature is 65ºC at 13:00 WIB that the position of paraffin inside pipe 2 with a solar intensity is 1195 W/m2 and the efficiency is 13.5%. The water inside of pipe 2 found the water out temperature is 62ºC and the efficiency is 12.31%. The position of air inside of pipe 2 recorded the water out temperature is 60ºC, and the efficiency is 10.21%. It can be concluded that the effect of adding paraffin inside of pipe 2 is better than water and air. The paraffin was able to absorb and store heat in large capacity according to volume ratio, and the process of absorption or release of heat energy that occurs at almost constant for all temperatures.

ID 625

Design of solid desiccant air conditioning system

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Currently, solid desiccant air conditioning system (SDACS) is an alternative to utilize solar energy to resolve environmental and energy issues resulting from the use of conventional vapor compression of air conditioning systems. SDACS can maintain the thermal comfort of a room with optimization of solar thermal energy and minimal use of electrical power. Present work in this paper is to design a solid

desiccant air conditioning system of a closed room with 18 m3 of total volume. The desiccant wheel is used to dehumidify air in the room, and evaporative cooling will be decreasing the temperature of the air. The result shows the lower temperature can be reached 24ºC.

Room-4	**:**	Kuantan 1
Topics	**:**	Electrical Engineering
Session Chair	**:**	Aulia, Ph.D

ID 552
Performance Analysis of Error Control Coding and Diversity in Image Transmission on Wireless Channels

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This paper discusses the performance of using error control coding that combines with diversity techniques in the transmission of images on wireless channelsto get reliable communication on noise and fading. The performance of the transmission system is not only determined by the effectiveness of channel usage, but it is also determined by the reliability of the communication system that causes noise and fading. Error control coding used in this research is Reed Solomon (RS) code, while diversity technique used in this research is Maximum ratio combining. RS code is used to correct errors that occur during wireless transmission, while Use of diversity Maximum Ratio techniques Combining expected can affect the number of errors, so that the signal transmitted to the wireless channels becomes more robust against interference caused by transmission channels. By using error control coding and diversity, the quality of image transmission at the receiver is increased.

ID 612
Wireless Monitoring System for Comparison Photovoltaic and Photovoltaic Thermal Characteristics

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This paper proposes a prototype of a wireless monitoring system. It was employed to compare the electrical characteristics of two solar modules of the same type and size. One of the solar modules on bottom side is mounted a copper pipe for circulating water (as call photovoltaic thermal). This system serves as a heat absorption on the bottom of the solar module. The experiment is conducted at the same time, place, and sunlight intensity conditions for both solar modules. The characteristics of open circuit voltage, short-circuit current, temperature upper side, temperature bottom side and the irradiation of sunlight from the two solar modules are observed. The low cost processor, ATmega 8535 is employed as embedded system and Visual Basic.Net as Graphic User Interface. The collecting data is processed and displayed graphically. The wireless communication is applied to PC and ATmega 8535. The measuring data is validated to instrument standard. The test results show that photovoltaic thermal generates greater electrical power than solar modules not equipped with heat absorption.

ID 567
PWM Speed Control of DC Permanent Magnet Motor using PIC18F4550 Mikrocontroller

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With various uses of control on permanent magnet DC motors that have been widely used with proven control systems efficient, and reliable. The purpose of this design was made to see the advantages of controlling the motor that can control permanent magnet DC motors so that motor performance is stable and changes in motor stability performance to control DC permanent magnet motor speed with PWM method with relay using PIC18F4550 micro-controller which is programmed to automatically control and control , to take the output signal from each controller and compare the control system and describe the output value and data related to the system. The microcontroller is programmed to compare the motor rotation speed detected by the sensor to the motor rotation speed that is input. The PWM method is able to maintain the motor speed better than the continuous voltage

method. Motor speed at full load is relatively better than the continuous voltage method. The motor current at the start of the data cannot be recorded because the time is very short. The current sensor used cannot measure the transient time domain.

ID 620

Robot Mobile Control Based on Three EMG Signals Using Artificial Neural Network

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The EMG signals can be produced from the human muscle activity.This paper explains about the control system of the robot mobile which uses the EMG signal from three muscles contraction such as the jaw muscles, the right arm muscles and the left arm muscles,.The peak values of the EMG signal was used as the input to the ANN system using the Backpropagation algorithm and it produces the output which has 9 target conditions; the forward, the turn right and the turn left where each of them has the variations such as the slow, the medium and the fast.The ANN has been trained with 270 ofthe training dataand it has been tested with 135 of thetesting datafrom 15 respondents who performed muscle contraction activities. Based on the test result, there are only two unrecognisable data with the rate of the system accuracyis 98.52%.The movements of the robot mobile can be controlled based on the recognized movement patterns with the specified target conditions.

ID 554

Performance Evaluation of Image Transmission Using Diversity Selection Combining Technique

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This paper discussed a simulation of SPIHT image compression transmission on wireless channels by using RS code and diversity selection combining technique in wavelet domain in order to get better reconstruction image by minimizing errors that caused by fading and noise. RS Code and Diversity Selection Combining Method were used to combat errors during image transmission on wireless channels. When the bit stream data arrived at the receiver, the coding was used to recover the errors in the bit stream. Diversity was used to obtain multiple data streams corresponding to the transmitted image at the receiver. These individual image data streams were combined to form a composite image with the better quality. The results shown both methods demonstrated quality improvement of received image.

ID 622
Towards Hand Gesture Based Control ofVirtual Keyboards for Effective Communication

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Individuals with disabilities are often restricted from performing certain daily life activities that the non-disabled persons would normally perform. One of such restrictions is in terms of daily life communication that would require listening, speaking, and sometimes movement of one's body part often referred to as gesture. Thus,disabled persons without fingers and cannot speak fluently finds it challenging to communicate effectively during daily life activities. Therefore, a virtual Graphical User Interface (GUI)-based keyboard communication tool is developed in this study to aid such individuals in their daily life activities. The developed virtual GUI-based keyboard can support different directional movement of the hand including up, down, left, and right, that were coded as different communication signs. The choice "select" can be done by turning the wrist up and "erasing" by turning the wrist down. Every hand movement is read and translated by leap motion sensor. There are two kinds of GUI used in this research, the first GUI with the Alphabet key is equipped with a pictorial word while the secondGUI Qwerty comes with a pictorial word. Experimental results with respect to the effectiveness of the typing effectiveness shows the alphabet GUI has a faster typing time than the Qwerty GUI with an average difference of less than 15 seconds.

Room-5	**:**	Kuantan 2
Topics	**:**	Electrical Engineering
Session Chair	**:**	Dr. Eng. Abdul Rajab

ID 466

Design of Poka-Yoke System Based on Fuzzy Neural Network for Rotary-Machinery Monitoring

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Early detection of machine failure will improve performance of the production process. The Poka-Yoke device was developed to monitor the machine. The vibration signal is captured by sensors and inputted in Poka-yoke device for processing. Poka-Yoke device has two components, Fuzzy-Neural Network identification and decision maker.The first component, the time-domain signal is transformed into the frequency domain, magnitude and frequency aretreated as Fuzzy membership functions by using the statistical parameters as mechanical harmonic distortion and then are trained by Neural Network.The second component, the decision is in the form of machine condition statements such as normal, alarm, and shutdown. Simulation's results show that the method can be applied to identify the machine condition in term of bearing faults. Moreover, the Poka-yoke system that developed can be used to monitor machine condition automaticly.

ID 542

Multichannel Audio Steganography Based on MPEG Surround using Direct Sequence Spread Spectrum

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Attention to the digital multimedia data encryption is very important today. Audio steganography is a technique for securing audio multimedia data by embedding secret messages into a digital audio that called audio cover without being noticed by others except the recipien.MPEG Surround (MPS) is a multichannel audio technology that can be implemented with steganography techniques. MPS can produce audio in 3-dimensional sound which embedded in a secret message. Direct sequence spread spectrum (DSSS) integrated with MPS by embedding secret

message into the downmix signal of multichannel audio thatgenerated from MPS encoder. The result of experiments show that the quality of audio that produced by system is good and signal synchronization can run smoothly. The mean value signal to noise ratio (SNR) of 16.67 dB. The secret message text can be extracted completely with mean value bit error rate (BER) of 3.38% and normalized cross correlation (NC) of 95%.

ID 486
Understanding Public Perception of Domestic Solar Water Heating System: Case study in Surabaya, Indonesia

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The present study deals with identification of causal factors and challenges in diffusion of solar water heating systems, particularly in the region of Surabaya, Indonesia. The study was carried out by surveying the residents and asking for their views as well as suggestions for the implementation. The study is intended to spread some awareness which will contribute to interest in solar water heating. It was found that the cost and awareness are the main issues in confining the utilization of SWH in Surabaya.

ID 607
Design of Fuzzy Logic Controller for Temperature Control of Small-scale Food Storage

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A Fuzzy Logic Controller (FLC) is developed to control the temperature of a small-scale food storage. The FLC has two components such as the algorithm part and the hardware part. For the algorithm part, The FLC takes two input parameter such as the temperature and the humidity of the storage and takes one output parameter such as the speed of fan. The membership function is designed as follow hot, fair, cold, and too cold as for the membership functions of the temperature parameter. For the humidity membership functions are dry, dry enough, normal, less moist, and moist. As for the fan speed, the membership functions are fast, less fast, fair,

slow, and too slow. On the other hand, for the hardware, the DHT11 senses the temperature and the humidity. For the cooling process, thermoelectric is used to decrease the temperature.The results show that the FLC can be used to control the temperature of the storage to achieve as the minimum temperature as 12.5ºC.

ID 597
Dipole Planar Bowtie Printed Antenna for ISM Application

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A research about dipole planar printed antenna with bowtie shape will presented for ISM application in WIFI technology. Study of the effect flare angle as bowtie antenna parameter on return loss of antenna is presented. Simulation using high-frequency electromagnetic field simulation with different Finite Element Method (FEM). The results show bowtie antenna with double flare angle has bandwidth better than traditional bowtie antenna and operate in triple band frequency.

ID 662 Comparison of Partial Discharge Signal Denoisation using Hard Threshold and Soft Threshold Methods and Wavelet Transformation with Some Levels

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The important thing to do after we detect the existence of partial discharges inside an isolation system is signal processing. One form of signal processing that needs to be carried out on the generated waveform is denoising or noise removal from the wave obtained. In this study an experiment will be conducted to denounce partial discharge waves using Wavelet and Threshold transformations. Wavelet transformation is applied in various levels then we compare the best denomination while denoisation using Threshold is applied using Soft Threshold and Hard Threshold.

Room-6	**:**	Arau
Topics	**:**	Civil Engineering
Session Chair	**:**	Taufika Ophyandri, Ph.D

ID 178
The Effects of the Distance Between Groundsill and Double Cylinder-Piers Against the Scour Patterns

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Flood disaster causes local scouring around the bridge piers. Some efforts to protect piers locally have been widely practiced, but the protective effect is only temporary. This is due to the riverbed being degraded within a few years, and eventually the pier protector is also broken. Groundsill has a dual function of setting the ground level of the channel and stopping local scouring on the pier to continue. The present study is about physically modelling in the laboratory to observe scour depths due to the distance between the groundsill and double piers. The position of the double piers remain, i.e. a line of flow direction, so there are upstream pier (called pier 1) and downstream pier (called pier 2). Only the groundsill positions are varried. The groundsill is located on the downstream of the pier 2. Some experiments are conducted to get the two best positions of the groundsill by trial and error, that is W1 (position 1) and W2 (position 2) using the biggest discharge flow that can be. The position W1 is better than W2. This is based on two criteria: the scour depth has to be stable (no more scour) at the specified time range (0 - 120 minutes), and the maximum scour depth formed has to be the shallowest among those in the other experiments. The resulting two best positions of the groundsill are then tested with three variations of discharge to observe the scour depth, and to observe the differences of the scour depths due to both piers in point 1 (behind the pier 1), point 2 (right side of the pier 1), point 3 (left side of the pier 1), point 4 (in front of the pier 1), point 5 (behind the pier 2), point 6 (right side of the pier 2), point 7 (left side of the pier 2), and point 8 (in front of the pier 2). The experimental results show that the maximum scour depth with the position W1 occurs in points 1 and 3 with a 2.9 cm deep and a maximum flow of 3.161 l/s. Meanwhile the maximum scour depth with the position W2 occurs in point 1 with a 3.8 cm deep and a maximum flow of 3.254 l/s. The scour characteristics with the point W1 is that a local scouring occurs significantly since the beginning of the flow, but channel bed has been stable since several minutes after the flow starts overtopping the groundsill. The flow with the position W2 shows that the backwater affects significantly the flow condition so that scour and

sedimentation process continuously occur. This experimentation also confirms that the control slope (the slope between riverbed where the piers are and the top of the groundsill) has a optimum distance. In this study the optimum control slope is -0.014.

ID 450
Identification of Construction Management System (CMS) in Construction Projects in Padang City

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Construction projects are growing increasingly large and more complicated both in terms of physical and cost. In the implementation, a project usually has limited resources; in the form of labor, materials, costs, tools, and challenges in the completion and project administration. Therefore, it requires a CMS (Construction Management System) starting from the initial phase of the project to the project completion phase. The Construction Management Association of America (CMAA) states that there are seven main categories of responsibilities for a construction manage, namely project management planning, cost management, time management, quality management, contract administration, safety management, and professional practice. This study aims to identify the contractors' implementation of CMS from the initial phase of the project to the final phase of the project and also to analyze the effect of the application of CMS on the projects.

ID 600
Shear Behavior of Fly Ash Reinforced Concrete Beam Without Shear Reinforcement

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An experimental study was carried out to discover shear behavior of reinforced concrete beam (RCB) using fly ash (FA) as cement replacement material. Variation of FA composition that was used as research variable were 10 %, 20 % and 30 % by cement mass. Each of variations has two RCB specimens while two RCB specimens used normal concrete (non FA) as control beams. Beam was reinforced

only in longitudinal direction without shear reinforcement. Beam was tested by static monotonically loading method. The results showed that the shear strength of RCB decreased by increasing the amount of FA.

ID 456

Analysis of Maintenance Management and Building Care In State University of Padang (Case Study of Educational And Office Building In State University of Padang)

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Since establishment on September 1, 1954, State University of Padang (UNP) has undergone many changes, especially in the number and shape of existing buildings. of course, it requires a Maintenance and Building Care management system. The purpose of this research is to know the description about the implementation of PU Ministerial regulation number: 24/PRT/M/2008, about: Guidance of Maintenance and Building Care at UNP. The method chosen to do this research is a descriptive method. Data is collecting by direct observation in the field, distributing questionnaires to 70 respondents divided according to their functions (16 leaders, 12 managers, 30 executor, and 12 students), collecting maintenance documents and building drawings, literature from research results, journals, building maintenance, and care manuals. The questionnaire is filled in numerical form and processed using an Excel program using descriptive and quantitative analysis that is displayed in the form of bar charts. The results of data processing show that the level of application of Public Works Ministerial regulation at UNP is between 53.01%-74.5%, which is categorized as good enough to Good. The results of this calculation cannot be used as a conclusion in the study, the data obtained need to be validated with other data, including data from direct observations in the field, as well as interviews with several leaders at UNP. After validation with the data, it can be concluded thoroughly that the implementation of the Public Works Ministerial regulation at UNP falls into the less good.

ID 556

Infrastructure Maintenance System for Community Development Projects to Improve the Quality of Infrastructure Services in West Sumatra Province

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This research study is about the maintenance system of infrastructure outcomes through community development projects. Operations or utilization activities are ways to use infrastructure and facilities in accordance with their function to improve the quality of life of people in their environment. While maintenance is an effort to keep the infrastructure and facilities built or existing to function according to its function and have a longer service life. This is a qualitative research with descriptive method. Data collection was done by interviews, focus group discussions (FGD), field observations, and documentation studies from community development Program (Program Dana Desa, Kotaku, Pamsimas, Sanimas, PISEW) in West Sumatera Province. Interviews are carried out to the government program counterparty/work unit, consultants or field facilitators, and society who beneficiary and maintenance the infrastructure. The results showed that the infrastructure maintenance process began with the formation of operasional and maintenance groups, technical training of operational and maintenance groups, preparation of technical documents for operation and maintenance, implementation of operation and maintenance activities. The infrastructure maintenance process is effectively implemented in the community based water supply and sanitation program (pamsimas) or clean water infrastructure. The constraints encountered in the field are that the level of public awareness of the infrastructure being built is still lacking, especially for urban areas, there is no salary for the operational and maintenance groups and the limitations of Human Resources in the Community, quite a lot of administration regulations, high mobilization or replacement of facilitators and unsustainable program assistance.

ID 459

Building Official`s Awareness in Term of Building Permit System in Indonesia

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This study aims to understand the level of awareness and competency of building construction officers in Indonesia regards to building resistance to seismic load and implementation of building permit system as part of their duty. The study area is Padang-Pariaman district, West Sumatra province in Indonesia. Understanding of the situation experienced by building officer is very significance, considering their important role to guarantee the quality of building especially in the earthquake-prone area. The method used in this study is interviewing building officer in 6 sub-districts in the target district. Interview conducted using question and answer sheet, as well as collecting related building permit document to support the results and improve the understanding of building construction process. The results show that almost 70% of the building officer seems are lack of understanding and capacity to conduct their job. Indicators of the level of education which more than 30% only graduated from high school and not more than 10% got the opportunity to strengthen their technical knowledge about building construction. 80% of staff never read building law no.28 the year 2002, as the main law regulates the building construction process, and 70% never read the technical guidance of building construction PP no.36 the year 2005.

Parallel Sessions III

Date : November 9, 2018 (Friday)

Time : 10.15 – 11.45

Room-1	**:**	Sumpur
Topics	**:**	Industrial Engineering
Session Chair	**:**	Elita Amrina, Ph.D

ID 427

Analysis of the Application of Quality Management Systems in Rubber Industry Based on ISO 9001:2015

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Increasing competition in global market and high consumer expextations for quality products, encourage companies to produce quality products of international standards. The rubber industry is part of an industry group that is

prioritized in its development in Indonesia. Based on these conditions, companies are required to always develop quality management systems that exist in the production process. The purpose of this study is to analyze the application of the quality management system of the crumb rubber industry to the ISO 9001: 2015 certification standard. Analysis was carried out on case studies and discussions with leaders of crumb rubber companies in Padang City. The success of the implementation is affected by indicators that influencing in ISO 9001: 2015 certification standards. Based on the results of the case study it can be seen that PT B has implemented an integrated quality management system in the company's business processes. On the other hand, PT A still needs much improvement in implementing an integrated quality management system and integrated in the company's business processes. it can be concluded that a strong top management commitment is not supported by the application of a quality management system. The implementation of a quality management system has not been optimally demonstrated by the company's quality control documentation system is still incomplete and the company has not involved all aspects of the company in the implementation of quality management systems.

ID 575
Optimization of Significant Factors of Cement Compressive Strength at PT Semen Padang

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The quality measurement of cement production is focussed on five factors, namely: Blaine fineness (Blaine), SO3 content (SO3), Sieving on 45 μm (Sieve), Loss on ignition value (LOI) and Biomass-to-liquid value (BTL). They were measured when cement was 3rd, 7th and 28th days old. This study analysed the effect of significant influence using multiple regression analysis and the optimal value of the five factors that affect compressive strength using the Response Surface Method (RSM). The results obtained for Portland Composite Cement(PCC)significant factor for 3rd day: Blaine: 379 m2/kg; SO3: 1.72%; Sieving on 45 μm: 8.78%; LOI: 5.40% and BTL: 7.75%. For 7th day compressive strength: Blaine: 389 m2/kg; SO3: 1.72%; sieving on 45 μm: 9.47%; LOI: 4.17% and BTL: 10.98%. For 28th day compressive strength: Blaine: 388 m2/kg, SO3: 1.78%, sieving on 45 μm: 8.49%, LOI: 4.20% and BTL: 8.18%.

ID 573

Technical Characteristics' Determination of Crumb Rubber Product by using Quality Function Deployment (QFD) Phase I

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Products that have the best quality are products that are produced by conducting research on consumer's need. Product indicators that have the best quality are the linkages between technical characteristics and consumer's need. PT XYZ is a company engaged in the production of crumb rubber products. However, the products produced are not in accordance with the needs of consumers because there are differences between the indicators required and the indicators produced by the company. The purpose of this study is to identify technical characteristics that are in accordance with consumer needs. The method that can be used is the Quality Function Deployment (QFD) method. The QFD method is a method that relate the relationship between consumer needs and product characteristics to obtain the products quality. In other words, by using the QFD method, consumer needs can be translated into technical characteristics so that improvements can be made to prioritized technical characteristics. The results obtained from this study are stating that the priority characteristics obtained are the speed of production with a difficulty level is 4, the degree of importance is 21%, and the estimated cost is 18%.

ID 656

The Analysis of Judgmental Forecasting Based on the Availability of Contextual Information

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Forecasting is an effort to predict the amount of product to be carried out in the future. There are many forecasting method such as quantitative forecasting method (Average Method, Single Exponential method and Croston) and qualitative forecasting method (Pure Judgment, Dephly). Quantitative forecasting method based on mathematical and statistical alqorithm, whre as qualitative forecast method mostly use the intuition of decision makers (judgmental forecasting). Thre

are a huge number of studies discussed judgmental forecasting. However, only a limited studies investigate the impact of the background of decision maker on the performance of forecasts results. This research aim to evaluate the effect of human judgment on forecasting results in term of the background of decision maker. The research methodology is as followed: first, data collection is conducted in an oil company in Indonesia. The data such as demand data in 29 periods (monthly), forecasting data resulted by the company and the contextual information in every month are collected by regarding the judgmental forecasting data, the data is collected by using quetionaire. The rrespondents are novices and practitioner. The respondents are grouped into the group that rreceive the contextual information and the group without contextual information. Forecasting error are calculated using Geometric Root Mean Squere Error (GRMSE). The finding show that the forecasting error produces by practitioner are smaller than forecasting error resulted by novices. In terms of offers the information to decision maker, the group of the information has a smaller forecasting error for practitioners compare with novices. The opposite result is happen to novices. From these findings, it can be concluded that giving contextual information and the background of decision makers give an impact on the performance of forecasting result.

ID 506
Application of Indoor Foliage Plants in Visual Inspection Activities

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Inspection is a major activity in quality assurance. The performance of visual inspection operator might be influenced by work environment factor. Many efforts have been conducted to increase comfort and work effectiveness by promoting a good work environment. Visual inspection activities usually take place indoor, sedentary, and take considerable time of a day. This activity requires a high amount of attention from the operator as well as its accuracy and visual acuity. Therefore, visual quality inspection activity may get benefit from the presence of indoor plants. The objective of the present study is to find out the effect of indoor foliage plants on the work performance of the worker in visual inspection activity. A laboratory experiment with 9 subjects was conducted by using 2 pots of sansevieria laurentii and 1 pot of aglaonema modestum. A significant effect of the presence of foliage plants on the work performance at visual inspection was found. The presence of foliage plants indoor can increase the work performance at visual inspection activity.

ID 491

Assessing Safety Performance of Tire Retreading Production Employees

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Occupational health and safety is one of the important studies that must be applied in the company. The aim of this study is to determine the index of occupational hazards on tire retreading activities in PT. IntiVulkatama. Direct observation of work behavior is done by evaluating hazard as well as with safety performance index (SPI) approach. The instruments were used in this research are critical behavior checklist (CBC) questionnaire and analytical hierarchy process questionnaire (AHP) for each workstation in processing department of hot and cold process. Based on the results of SPI calculations that have been integrated between the results of questionnaires CBC and AHP obtained workstationwith the value of SPI <0,5 indicated unsafe is scrape workstation with SPI 0.498, side cut workstation with SPI 0.496, and hot process workstation with SPI 0.492.

Room-2	**:**	Ombilin 2
Topics	**:**	Mechanical Engineering
Session Chair	**:**	Dr. Oknovia Susanti

ID 531

Sound Absorption Characteristics of Natural Fibrous Material from Coconut Coir, Oil Palm Fruit Bunches and Pineapple Leaf

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In this paper sound absorption characteristics of three kinds of natural fiber composite is evaluated. The fibers are made from coconut coir, oil palm fiber from empty fruit bunches, and pineapple leaf. The sound absorption coefficient is evaluatedusing specimen thickness of 10 mm and 20 mm and two various of fiber density. A simple impedance tube with two microphones is used in the measurement. Sound absorption coefficient is calculated by transfer function of the two microphones within 200 Hz to 3000 Hz frequency range. It is revealed that three types of fibers are able to reduce reflected sound in relatively higher

frequency. Denser and thicker of a fibrous material increases the sound absorption of the material and shifts the peak of the absorption coefficient into a lower frequency. Furthermore, pineapple leaf fiber has the highest absorption coefficient among other's type of fibers. Smaller and uniform fiber diameter has a significant role to absorb sound energy inpineapple fiber. Whereas, coconut coir and palm empty fruit bunches fiber have larger, various and random fiber diameters, that could make the sound absorption coefficient become lower, especially within frequency range of measurement – below 3000 Hz.

ID 570

Synthesis and Characterization of Calcium Precursor for Hydroxyapatite Synthesis from Blood Clam Shell (Anadara antiquata) Using Planetary Ball Mill Process

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Calcium precursor for synthesize of hydroxyapatite can be obtained from natural material like *A. antiquata* (blood clam shell). Calcium synthesis was carried out through ball mill and calcination process with high purity residues. Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray Analysis (EDX), X-Ray Diffraction (XRD), and Fourier Transform Infrared Spectroscopy (FTIR) were used for characterization. Analysis for blood clam shell powders revealed reduction of average size from 217 μm to 76 μm and size of powder crystal is 29,2 nm. This powders contained calcium element about 49,67% as effectiveness of calcination and ball mill process. In morphology, powders have fine needles-like shape but still in agglomerate that can be reduced with extended ball mill process. This powders have reduction of weight powders from 35,5% to 17,7% and dominated $Ca(OH)_2$ that could be used as calcium precursor in synthesis hydroxyapatite.

ID 583

Production of Pig Iron Nugget from Low-Grade Iron Ore and Pyrolyzed Oil-Palm-Empty-Fruit-Bunch Composites

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Utilization of low-grade iron ore and pyrolyzed oil palm empty fruit bunch(EFB) is aneffective way as the solution to deal with the depletion of iron reserves and administer of empty fruit bunch waste. This study was aimed to analyze the pig iron that is produced by carbothermic reduction of low-grade iron ore with pyrolyzed palm oil EFB as a reductant. The ore from Lampung was reduced at temperature 1400^{o}C and 1450^{o}C for holding time40 minutes with inert condition (N_2 atmosphere). The structures of pig iron were studied by using X-Ray diffraction (XRD), and the microstructures and chemical composition were analyzed by using Scanning Electron Microscopy-Energy Dispersive X-Ray Spectroscopy (SEM-EDS). It was found that iron nugget that was reduced at 1450^{o}C for 40 minutes that was wholly separated from its slag, with reduction degree 98.5%, metallization degree 99.2% The microstructure has metallic iron as a base with some pores. On the other hand, the other iron nuggets that are not separated from its slag consist of two prominent phases, metallic iron and lamellar fayalite (Fe_2SiO_4).

ID 646

Product Characterization of Reduced Lateritic Nickel Ore Coconut Shell Charcoal Reductor at High Temperature

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The use of biomass carbon as a reducing agents in lateritic nickel ore reduction is one alternative to substitute dependence on conventional reducing agents such as coal and cokes. The difference in particle size distribution from reduced ore shows differences in characteristics that can be used as a reference in the next step extraction process of lateritic nickel ore. In this study, characterization of lateritic nickel ore reduction at high temperatures using coconut shell charcoal as a biomass carbon reducing agent. Reduction process was carried out at 1200^{O}C and holding for 90 minutes, heating continued until 1500^{O}C and holding for 15 minutes. Effect of particle size distribution from lateritic ores reduction was investigated by chemical composition, especially changes in the composition of iron and nickel. In addition, mineralogy analysis and microstructure characterization were perfomed to analyze compounds, morphology and elemental mapping analysis after reduction in each particle size distribution.

ID 650

Tensile Properties and Transparency of Poly-Vinyl Alcohol (PVA) Film Using Ultrasonication Method

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The main objective of this work was to measure the tensile properties and transparency of PVA 2488 film using ultrasonication method. The PVA gel was sonicated using a 360W ultrasonic probe for 2.5, 5, 7.5 and 10 min. The results of this study indicate that a film after 7.5 min vibration, tensile strength increased almost 30%, strain at break 15%, and decreased opacity 8%. However, longer sonication times resulted in a decrease in the tensile strength, and an increase in the transparency.

ID 643

Optimization of maxtrix compositions of Al2O3, SiO2, Caolin and CaO on the mechanical properties of a geopolimer composite with short carbon fibre

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Geoplimer is a material synthesized from a base material with a large amount of silica and alumina.Geopolymer can be used as an affordable alternative as a substitute for portland cement, reducing pollution, and resistant to fire under certain conditions. But pure geopolymer has not been widely used in industrial areas because overall it has low toughness and mechanical properties when compared to metals or ceramics. This research was conducted in an effort to produce geopolymer composite material with good mechanical properties and can be applied as a material in making environmentally friendly pipes, by identifying the influence of the composition of the gopolymer base material using the taguchi method. Generate Geopolymer composites with the addition of Silica Powder and random short carbon fiber have good mechanical properties, from the results of the experiment produced the best flexural strength in T9 specimens with details of

the composition of Silca Powder (27 g), Kaolin (55 g), CaO (6 g), and Carbon Fiber (13 gr) with a flexural strength of 41.46924655 MPa and flexural modulus 6 GPa.

Room-3	**:**	Ombilin 1
Topics	**:**	Electrical Engineering
Session Chair	**:**	Adrianti, Ph.D

ID 528
Harmonic Analysis in Electrical System at Andalas University Hospital

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Andalas University Hospital has high priority in the power quality. The main representation of power quality is the harmonic distortion. In this paper, harmonic distortion in electrical system at Andalas University Hospital is analysed. Harmonic distortion was measured by The Fluke 430-II power analyser for three days from 27th - 29th June 2018. The data was recorded each ten minutes.The THD of the current and the voltage obtain from the 24-hours period. The THD of the current was from 3.09 % on Thursday at 08.40 (in phase L3) to 9.35 % on Thursday at 23.00 (in phase L1). The values of the THD show that high values of the THD occur at night from 18.00 to 08.00at morning.There are more non-linier loads such as lighting. The widespread use of the energy-efficient lamps will increase harmonic distortion in electrical system. The low values for the harmonic distortion of the installation occur during the day from 08.00 to 18.00 that occur for low active power. It was noted that the loads during the day outside medical equipment, telecommunication equipment and office equipment are more the linier loads that do not contain harmonics with the composition for 70 % of the total loads otherwise the medical equipment, telecommunication and some of office equipment are the non-linier loads with the composition for 30% that main cause harmonic generation in electrical system. Therefore harmonic distortion in electrical system during the day was quite low. The current harmonic distortion was depending on the type of load. The non-sinusoidal current has harmonic content that interact with the electrical system will create voltage distortion in the electrical system even if the supply is sinusoidal.

ID 548

Voltage Stability Evaluation based on Power Flow Analysis using Newton Raphson Method (Case Study: Central and South Sumatra Subsystem)

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This journal discusses the evaluation of voltage stability of electric power systems based on power flow analysis by Newton Raphson method. An electric power system consists of many generators, transformers, active and passive elements and other interconnected equipment in the transmission network between several or even hundreds of buses. Evaluation of voltage stability was also carried out to obtain information about system voltage stability under steady-state operating conditions. This information is needed to evaluate the performance of the electric power system and analyze the conditions of generation and loading of both normal and emergency conditions. Another reason is needed to evaluate the stability of the voltage, to see the performance of the electric power system when the electric power system is expanded by adding the transmission network and the load to meet the development of electricity needs of an area. With this evaluation will be guaranteed that the new power system can meet electricity needs economically, efficiently and safely. Evaluation of voltage stability can be taken in several ways. One of them is by evaluating voltage stability based on power flow analysis. Many methods are known for power flow analysis including Gauss Seidel method, Newton Raphson method and Fast Decouple method. In this study a stability evaluation based on power flow will be discussed using Newton Raphson's method with a case study on the Central and South Sumatra subsystem (Sumbagselteng). The evaluation results show that there are several load buses whose voltage values are below 1.0000 pu. In anticipation of a greater voltage drop, reactive power injection is carried out in the form of mounting a certain value capacitor on these buses and obtaining a greater and greater voltage magnitude equal to 1.0000 pu

ID 566

Study on Static Electrification of PFAE-Mineral Oil Mixture

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The natural ester of tri-ester type has been implemented on a high voltage large power transformer, rated at 420 kV, since 2014. The high voltage transformer is known prone to the static electrification risk. Palm fatty acid ester (PFAE) which is a monoester oil type has also been tried on the high voltage power transformer. For a retrofilling purpose, some portion of the previously used insulating oil (it is mainly mineral oil) will still remain in the transformer. It is then demanded to study the static electrification of a mixture of PFAE and mineral oil. This paper presents an investigation results on the static electrification properties of PFAE-mineral oil mixture at various percentage ratios of PFAE. The results show that charging tendency (ECT) increase with the percentage ratio of PFAE, but then decreases for the oil containing only PFAE. On the other side, the resistivity of oil mixtures decreases with the increase of percentage ratio of PFAE but then increases for the oil containing only PFAE.

ID 572
Analysis of the Unbalanced Harmonic Propagation in Three-Phase Power System using a Parallel Program

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Operation of the non-linear device in an unbalance condition can cause harmonicproblems in power system. There are two parts in the use of computing time in harmonic load flow, the first in the construction of harmonic admittance matrix and the second is the iteration scheme for solving systems of linear equations. The solution technique of the harmonic admittance to the problem can be expressed in this paper, harmonic admittance was developed as a parallel applications, and a direct algorithm to calculate the admittance matrix elements are presented. The three phase power flow program is decomposed into three independent sub problems, namely: sequence network of positive, negative, and zero. Positive sequence network will be solved by using the Newton Raphson method without modifying their formulation. Negative and zero sequence networks solved using nodal voltage equation. All three sequence networks have been modeled by three independent circuits and solved simultaneously using multi-core processors in parallel programming. The results showed that the parallel three-phase load flow produce execution speedup compared with sequential

ID 644

Satic VAR Compensator For Improving Voltage Profiles and Transmission Losses: Case Studying Batam

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Batam has companies engaged in the industry and requires a good quality of power in the distribution. To solve the voltage drop in power transmission in Batam, FACTS Devicessuch as SVCcan be mounted. SVC can absorb/produce reactive power to control the flow of power to the electrical system of Batam. Newton Raphson method is one method of power flow contained in the ETAP program 12.6.0. By simulating the Batam electrical system, it can be seen the power flow in the system prior to the addition of the SVC. The Simulation result suggested to install an SVC on bus 20 kV GI Tj. Uban with generated QC and QL values are 15,699.2 kVAR and 31,358.18 kVAR. With these values, the voltage can be improved about 1.132 kV with an active power difference of 6 kV.

ID 581

A Leakage Current Forecast of the Using ANFIS Method Based on LabView Pre-processed Thermal Image

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This paper reports leakage current estimates based on Thermal (Infrared) image of the polymeric insulator by using LabVIEW as initial data of ANFIS method for the purpose of condition-based monitoring. In this study, the heavily contaminated polymeric insulator image was taken using the FLIR-A600 thermal camera series. The laboratory pollution performance test was done according to IEC 60507 standard with 18 kV AC voltage. The severity of the pollution is shown as the ESDD value of *very high* contaminated and the relative humidity conditions are maintained at 80 RH and temperature at 28^0C. The LabVIEW was used to calculate the RGB color percentage of the related thermal image for specific measured leakage current. These RGB data is as the training data for ANFIS to forecast the leakage current. The results show that this method is able to forecast the leakage current without time-consuming to reach RMSE 0.00008.

Room-4	**:**	Kuantan 1
Topics	**:**	Civil Engineering
Session Chair	**:**	Masrilayanti, Ph.D

ID 673
Earthquake-friendly Foundation using Web of Concrete Ribs With Vertical Wedge

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A shallow foundation system using web of concrete ribs with vertical wedge is designed and has already been invented. This is a very low cost foundation system compared to other methods of buildings to survive massive Earthquakes. This is due to the use of 85% soil material for the total space used. As of today, there have been nearly 1,000 buildings constructed with this kind of foundation, and of those circa 170 units have experienced earthquakes of magnitudes between 6.5 SR and 9.3 SR, and those have all survived for a 100% success ratio.

ID 439
Simulation of the Effect of Floodway on Batang Kandis River Flood Control

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Floods often occur in Padang City, mainly in the areas of Pasia Nan Tigo Village and Lubuk Buaya Village, caused by the overflow of Batang Kandis when heavy rains occur (intensity of rainfall >15mm/hours). To decrease the river, overflow an artificial canal with300 m long and 50 m wide (floodway) was constructed to bypassing the river flowfrom the Batang Kandis River to the ocean. To find out the effects of the floodway, four scenarios areperforming the scenario 1 and 2 were the simulation condition of Batang Kandis River before and after construction of floodway. While to increase the effectiveness of floodway, simulations 3 and 4 were carried out. Scenario 3 was the combination of floodway with normalization and embankment. To prevent the entry of sea water into the Batang Kandis River,

because the floodway is affected by the tide of the sea, then 3-door motion weir was simulatednamely scenario 4.Scenario 4 was the combination of floodway normalization, embankment and a 3 door metion weir. From the simulations we found that the floodway was effective to decrease the water surface level up to 15 m and 20 m during 10 year and 25 year return periodof discharge respectively. From the scenario 3 we found that the embankment with 1.5 m and 2 m was effective to prevent overflow by 10-year and 25-year return period of discharge respectively . While for scenario 4 the water level rises 0.5 m due to motion weir. So that it is needed to extend the embankment with 0,5m high.

ID 565

The Study of River-bed Change and Bed-load Transport in the Middle Segment of the Batang Kuranji River

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Batang Kuranji is one of the biggest river in Padang City with catchment area of 202,7 km^2. In the middle segment of this river have degradated significantly, especially in the downstream side of Gunung Nago Dam after the big flash flood in 2012. This also supported by the steep river slope 0.017 and the activity of excavation of sand and gravel downstream of Gunung Nago Dam. Based on this, the authors are interested in examining the the study of River-bed change and bed-load transport in the middle segment of theBatang Kuranji river to determine the amount of sediment and changes in River-bed elevations that occur and analyze the location of proper building to reduce water damage.In conducting this research, researchers collected primary data, namely direct sampling in the field and secondary data from various relevant literature sources. In this study seven methods of calculating bed-load transport were used, including Meyer Peter Muller, Einstein, Einstein-Brown, Kalinske, Frijlink, Engelund and Hansens, and Van Rijn. Based on the results, there was a change in River-bed elevation, in the period of 2011 to 2013 there was a scour volume of 902,527,693 m^3 greater than the sediment volume of 193,235,094 m^3 where the sediment occurred was only 21.43% with the deepest scour 10.52 m. Kalinske sediment transport method has the closest value to manual calculation. The comparison between Kalinske method and manual calculation respectively; 0.056 m^3/day and 0.187 m^3/day in S_{12} sample; 0.312 m^3/day and 0.554 m^3/day in S_{23} sample; and 0.020 m^3/day and 0.081 m^3/day in S_{33}. The potential for degradation still occurs in stakes 2 - 24 and

stakes 26 - 34 to achieve stable conditions and reduce resources still requires the construction of check dams or groundsil.

ID 469

The implementation of sustainable community-based enviromental sanitation development policy (slbm) in Tebo Regency

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Sanitation is an important thingin the daily life. The poor sanitation case is one of fundamental problemsof health and environment. However, the effect of poor sanitation takes a long time to appear, so that most of people do not care about it. This ignorance will make it become bigger problem. There are some proper interventions to solve this problem, such as the structural act or other social acts that aims to reconstruct the health condition, to improve the quality and dignity of life, and to protect the environment.The primary data of this research were gained from local government (*Buku Putih Sanitasi, Strategi Sanitasi Kabupaten dan Memorandum Program Sanitasi*) and the additional data were obtained from archives and all data related to the topic (SLBM). Actually, the implementation of SLBM in Tebo is good enough, but there are deficiencies in some aspects, such as there is no training, KSM is not working, lack of socialization and facilities, un-standard incentives, lack of good synergy among stakeholders, and lack of human resources. To improve the implementation of sanitation through SLBM, it needs the commitment among the stakeholders, local government's support for the KSM training, improving the socialization and people awareness.

ID 636

Determining the Priority Criteria and Ranking of Provincial Bridge Maintenance in West Sumatra using a combination of the Fuzzy Analytical Hierarchy Process and Vikor-Modification methods

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There are many bridges that need to be maintained in a Provincial road network, with limited funds for bridge maintenance, and many bridge criteria (average daily traffic, economic benefits, fund budget, technical conditions, bridge hierarchy, spatial planning, flood potential, type of damage, erosion potential, age and surface concrete, etc.) with various levels of conditions, are a number of criteria that are taken into account in the decision making by the government as an institution responsible for the functioning of roads and bridges in serving its users. During this time, the selection of bridge maintenance priorities in West Sumatra Province was decided through a coordination meeting between agencies. Because of the variety of criteria, and sometimes relatively without going through considerations and sufficient technical analysis, it is often a problem for the government in determining the choice of bridges to be repaired in the following year, so that the realization of maintenance is considered to be less precise [1]. The choice of criteria and decision making is very important, because the bridge in the provincial road network is a part of the Indonesian Road Network, which cannot be separated in providing access and public transportation services. This research initiated, what are the selected criteria to be taken into consideration, then what is the order of the important criteria, and this study also conducts a sample selection of a number of bridges in the selected network segment. To determine the choice of criteria and ranking criteria, this study involved a number of road and bridge maintenance experts at the Ministry of Public Works, Road and Bridge Research and Development Institutions, as well as the Department of Public Works and Spatial Planning of West Sumatra Province. This study uses a combination of Fuzzy Analytic Hierarchy Process (to determine weighted criteria) and VIKOR-Modification methods (to determine the order of choice of bridges to be handled). This study gets eight criteria that can be used in determining the priority of bridge maintenance, with the priority sequence of the most important are: bridge technical conditions, aging of the bridge, average daily traffic, economic benefits, road function, budget, disaster risk (flood, Landslides, Tsunamis) and Spatial Plans. And get the order of the bridge selected to be repaired from a number of bridges in the road segment.

ID 671

Relative Displacement Effects of Integral Bridges due to Vertical Earthquake Loads

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One important consideration in designing a good earthquake resistant structure is the relative displacements which can occur at the support points on structures where there is significant spacing between. This study investigates the effect fo relative displacement which is representated by dynamic magnification factor of integral abutment bridges due to vertical earthquake loads. The term vertical earthquake loading is more related to the comparison with relative displacements applied to the integral bridge. Dynamic magnification factor is nondimensional number regarding the relation between static and dynamic behavior of the structure. The method conducted in this study was by doing 2D model of a 60 meter concrete integral bridge. The bridge then was receiving a displacement time history which obtained from regenerating design response spectrum, with a 0.35 *g* peak ground acceleration, and the time histories were then used to carry our full integration time history analyses in ANSYS (engineering simulation software) to simulate the dynamic response of the bridge. The results show that relative displacements play an important role in overall structural response of the integral bridge, compared to the pure dynamic response in the absence of relative displacement. The results of this investigation also show that for an integral bridge with this particular configuration, the values of static and dynamic moment are small in the vicinity of the middle of the spans. Hence, static relative displacement moments are not significant in these areas. Instead, the highest moment values occur in joints of the structure. By way of explanation, the results of this study indicate that the relative displacement tends to have dominant effect at joints within the structure. It also can be noticed that a structure with relative displacement yields a larger dynamic moment than those caused by dynamic response effects alone.

ID 665
Seismic Retrofitting Analysis Using Concrete Jacketing and Shear Wall on RC Frame Structure

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Due to some damage on the structural element of dental hospital building of Andalas University, an evaluation of the structure's feasibility was carried out. Based on the evaluation according to the current seismic code, SNI 03-1726-2012, it was found that the building not strong enough to resist the combination loads acting on the structure, especially seismic load. Seismic evaluations show that the existing structures did not correspond to the new seismic code, more restrictive on design requirements. Therefore, it was analysed to seismically improve structures

using three methods: adding concrete jacketing and shear wall. The concrete jacketing method was conducted by enlarging the cross-sectional dimensions and adding reinforcement bar to the element structure (beam and column) that is unable to support the loads. By using the concrete jacketing method, it turns out that there are many structural components must be strengthened. Because many structural elements are required the reinforcement, another retrofitting method is proposed in the form by adding the concrete shear wall. Shear wall is specially designed structural walls include in the buildings to resist the horizontal forces that induced in the plane of the wall due to earthquake forces. From the analysis results, the two retrofitting methods are effective to reduce the internal forces and displacement of building the structure. These retrofitting methods can be used as a recommendation for the strengthening of the Teaching Hospital Building.

Room-5	**:**	Kuantan 2
Topics	**:**	Environmental Engineering
Session Chair	**:**	Dr. Eng. Zulkarnaini

ID 496

Effect of Tannery Wastewater Exposure on Chromium Detected in The Gill of *Oreochromis niloticus*

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This study aims to analyze the bioaccumulation of chromium (Cr) contained in gill of *Oreochromis niloticus* L. due to exposure to wastewater from a leather tanning industry in West Sumatra. Tilapia was exposed to the wastewater for 30 days and Cr concentration was measured in the gill of tilapia with Atomic Absorption Spectrophotometer (AAS). The variation of wastewater used was 1.85% and 3.69% of the LC-50 96 hourr. The results showed that the BCF value were<100 for both variation. It can be concluded that *Oreochromis niloticus* L.has a low bioaccumulation of chromium contained in tannery wastewater. Keywords: bioaccumulation, chromium, tannery wastewater.

ID 598

Distribution of Organic Contamination based on Depth Stratification in Maninjau Lake, West Sumatera, Indonesia

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The purpose of this study was to analyze the organic content of Lake Maninjau based on the stratification of the depth and capacity of Maninjau Lake due to the burden of organic pollutants. Sampling was carried out at the location of lake utilization, namely in the middle, domestic, hydropower, endemic and KJA in accordance with SNI 6989.57: 2008. The parameters measured are BOD, COD. Lake Maninjau generally is in a polluted condition, especially for organic pollutants characterized by the BOD and COD values obtained do not meet the quality standard of RI RI 82 year 2001 class 2 with a BOD value between 21.87-47 mg/L and COD between 35.2 -74 mg/ L. The load of pollutants found in Lake Maninjau has exceeded its capacity with the highest pollutant load coming from the activities found on the lake especially fish cages.

ID 474

Geometric Accuracy Assessment of Very High Resolution Optical Data Orthorectified using TerraSAR-X DSM to Support Disaster Management in Indonesia

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Advanced remote sensing satellite data with detail spatial resolution can be an alternative to aerial photography and outweigh in providing rapid and vast spatial data, reaching remote area, and consist of multispectral band to produce continues information. The various types of very high spatial resolution satellite data benefit in producing information for large scale mapping, such as updating urban map and supporting disaster management for mitigation, preparedness, emergency response and recovery in effectively and efficiently. Large-scale mapping information for disaster management, particularly for quick respond is important to map the impacted sites, measure the number of housesdamaged and infrastructure damaged and determine the evacuation area. However, in producing large scale mapping, the information should refer to the geospatial specification standard, such as accurate geometric, completeness and detail thematic

information. This study aims to identify the use of Pleiades imagery for supporting large-scale mapping, including for disaster management by assessing the geometry accuracy produce from standard product from ground station and systematic orthorectification using different types of DSM, including TerraSAR-X and improvement using ground control points.

ID 632
Column Study of Aluminium Adsorption from Groundwater by Natural Pumice

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The removal of aluminum from groundwater by natural pumice from Sungai Pasak, West Sumatera, Indonesia was investigated in a fixed-bed column. The column performances were evaluated by varying the adsorbent bed depth (65–85 cm) and influent flow rate (2 - 4gpm/ft^2 equal to 43–87 mL/min). The results revealed that the increase in bed depth increased the amount of adsorbent used, thus increasing the total removal of aluminum and prolonged the lifespan of the natural pumice column. However, the increase in influent flow rate resulted in the shortened lifespan of the column. The increased flow rate also caused the column exhaustion time to occur earlier. The column system with a bed depth of 85 cm and flow rate of 2 gpm/ft^2 (43 mL/min) showed the best aluminum uptake performance in this study with a total removal of 59.5% and an adsorption capacity of 0.056mg/g. The results showed that the natural pumice has potential for removing of aluminum from groundwater by column.

ID 608
Study of the Effect of Pipe Diameter Changes on the Properties of Fluid in Closed Channels Using Osborne Reynold Apparatus

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The flow profile in the channel will affect the velocity of fluid distribution. One factor that influences the flow profile in a closed channel is its diameter. Therefore, this study aims to analyze the effect of changes in pipe diameter on the nature of fluid flow in closed channels using Osborne Reynold Apparatus. This tool uses a vertical glass pipe with a diameter of 1 cm and 3 cm. The operation of the Osborne

Reynolds Apparatus is carried out by flowing the fluid through a channel with a PVC type pipe pumped with a Submersible pump into an acrylic tub, then passing a vertical clear glass pipe. The Reynolds value obtained from each test equipment is 1,323-5,748 with friction factor 0,03-0,04 on Osborne Reynold Apparatus 3 cm diameter and 1,103-4,512 with friction factor value 0,03-0,05 at Osborne Reynold Apparatus 1 cm diameter. It is known that the greater the channel diameter, the greater the Reynolds value, while the friction factor will be smaller. Regression and correlation analysis was carried out with the aim to determine the relationship of the values obtained and obtained the results of a very strong relationship between time, discharge, flow velocity, Reynolds value and friction factor in each test equipment. This is evidenced by the coefficient of determination and the correlation coefficient obtained (R2 = 0.994-1,000 and r = 0.981-1,000).

ID 631

Effects of Different Pre-treatment Methods on Anaerobic Mixed Microflora for Hydrogen Production and COD Reduction from DomesticEffluent

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Effects of different pretreatment methods on sludge inoculum were evaluated with respect to hydrogen (H_2) production enhancement and COD reduction, using domestic effluent in a batch system. The sludge was taken from a recycled line of the activated sludge reactor. Two types of pretreatment are investigated, heat treatment and chloroform treatment. The experiment without sludge pretreatment was also conducted as control. The experiment was conducted at pH 4-6 and inoculum sizes of microbes were 10%, 20%, and 30%. The result shows that 30% COD reduction was achieved for chloroform pretreatment at pH 3 and 10% inoculum size. For heat treatment, a maximum COD removal of 60% was achieved in the experiment at pH 6 and 10% inoculum size. For chloroform pretreatment, a maximum volume of gas evolved was 3.6 ml, at pH 3 and 20% inoculum size. For heat pretreatment, maximum biogas evolved was 2.1 ml, at pH 3 and 10% inoculum size. The experimental results showed that the pretreatment methods (heat treatment and chloroform treatment) at 35 °C and initial pH 5.5 had a positive influence on H_2 production yield and chemical oxygen demand (COD) removal efficiency during the fermentative H_2 production as compared to the control experiments (without pretreatment). Heat treatment method was shown

to be a simple and useful method for enhancing both H_2 producing and COD removal processes from domestic effluent with highest H_2 yield and COD removal efficiency at 0.313 mmol H_2/g COD and 86%, respectively.

Room-6	**:**	Arau
Topics	**:**	Mechanical Engineering
Session Chair	**:**	Dr.Eng. Jon Affi

ID 651

Surface Characterization of The Ceramic Coating Process on Aluminum Matrix Composite Reinforced Particulate

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Particulate-reinforced aluminum matrix composite for automotive components are developed, sincethey havelight density, high strength and hardness, wear-resistant properties also low heat expansion coefficient compared to ferrous metals. An important factor that influences the composite characteristics is the condition of interface area between particle and aluminum matrixwith optimal wettability and minimal cavity defects. This research aims to improve hardness on particulate-reinforced aluminum composite which produce by a squeeze casting manufacturing process and ceramic coating process. Steps of this research include the development of an aluminum matrix composite manufacturing processes, which is followed by a ceramic coating process. Matrix composite material made of Al-7Si-9Zn-6Mg matrix with strengthened of 10% alumina (Al_2O_3) and 10% silicon carbide (SiC) particles,while for coating materials using Chromium Oxide, Aluminum Oxide and Ez Zirconium. The results of the hardness test without the ceramic coating process are an average of 71 HRB (127 HV).After coating process, obtained hardness value of 163 HV for coating material of Chromium Oxide, 373 HV for Aluminum Qxide, and 338 HV for Ez Zirconium. The wear resistance test results in abrasion values of 2.222 $x10^{-6}$ mm^2/kg for coating materials of Chromium Oxide, 1.633 x $10^{-6}mm^2$/kg for Aluminum Qxide, and 7.021 x $10^{-6}mm^2$/kg for Ez Zirconium.

ID 658

Hardness and Impact Energy Absorbed Produced by Q&T Steel and DQ&T Steel

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Hot rolled plate steel is heat treatable steel made in Indonesia for commercially developed to Quenched and Tempered Steel.This steels made by PT. Krakatau Steel (Persero) Cilegon, Banten, Indonesia. The aim of this study to improve the hardness and energy impact through heat treatment of double quench + temper. The method used is heating up to 900^{o}C (maintained for 30 minutes and cooled by water) for fives specimen hot rolled plate steel and produce the quenched 900 steel (Q_{900} Steel).Four Q_{900} steel specimens were heated at 750^{o}C, 800^{o}C, 850^{o}C, and 900^{o}C (maintained for 30 minutes) each. Then five specimens (include Q_{900} Steel) are tempered at 150^{o}C (maintained for 30 minutes) and produced Q_{900}&T Steel, $Q_{900+750}$&T Steel, $Q_{900+800}$&T Steel, $Q_{900+850}$&T Steel, $Q_{900+900}$&T Steel. Results of the study were changes in microstructure, hardness and impact energy. Hardness and impact energy absorbed of $Q_{900+750}$&T Steel higher than Q_{900}&T Steel.

ID 666

The Needs to Investigate the Effect of Road Surface Vibrations to the Fatigue Life of a Coil Spring

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The study aims to investigate the effect of vibrations to the fatigue life of an automotive coil spring. Acceleration signals were measured at a coil spring while the passenger car was being driven on road surfaces. Using a developed multi-body dynamic simulation, the acceleration signals were transformed into strain signals, and then, they were utilised as the input for performing fatigue tests. From the results, it was obtained that the rough road surface provided shorter fatigue life, which was 64.5 %. It indicated that rough road surfaces significantly effect to a component life.

ID 663

Mechanical Properties of Mild Steel by Adding Theobroma cacao Peels Extract (TCPE) Inhibitor

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The ability of corrosion inhibitor Theobroma cacao Peels Extract (TCPE) has been tested to improve the mechanical properties of mild steel after corrosion occured. These properties were tested to measure its hardness, tensile and fatigue. Scanning electron microscopy (SEM), Energy dispersive X-ray spectroscopy (EDX) and atomic force microscopy (AFM) were used to analyze the morphology of the surface. The corrosion rate was found reducing, on the contrary, the efficiency was increasing as the increasing concentration on the extract. This raising was followed by an increase in mechanical properties, namely hardness, strength and fatigue strength. Indeed, the presence of absorption on the surface of the data was reinforced by EDX, X-ray photon spectroscopy (XPS), and AFM for topography. Apparently, the addition of polar extract of cacao peels in HCl 1.5M is very effective to reduce the corrosion rate on the mild steel surface and it can retain its mechanical properties after the corrosion occured.

ID 670

Effect of Coating Time and Protective Current on Thickness of Paint Layer of Steel ST-37 by Continuous Painting

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Corrosion is a major cause of the failure of the materials; especially in the cutting tools that mostly use carbon steel ST-37. Painting is performed on ST-37 to reduce or protect metal surface from the destructive effects of weather or the occurrence of corrosion. Besides, it is also applied to improve esthetical and artistic value of metals. This study was conducted to determine how the influence of the current as well as the time of protection on the thickness of paint by continuous painting method. In this method, the specimens are hanged and hooked at driving belt that put on the coating tub, and then the specimens are moved along tub during the painting process using motor.The variables used for protection current are 1A, 2A,

and 3A, while the variable times of paintings are 30, 45, and 60 minutes. The thickness of painting is investigated by Optical Microscope. As results, the thickness of paint layer at current of 1A, 2A, and 3A and time of 30 minutes are 154.15, 166.6 and 172.8 μm. For the coating time of 45 minutes, the thicknesses of paint layer are 162.4, 181.2, and 191.6 μm. Meanwhile, for coating time of 60 minutes with same above current, the thicknesses of paint are 235.3, 252.05, and 279.1 μm. The effective protection layer is found at protective current of 1A,on 30 minutes of coating time with a thickness of paint layer is 154,15 μm.

ID 659
In vitro of Mg-1.6 Gd alloys after Hot extruded for Biomaterial application

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Mg-1.6Gd (wt%) alloys have attracted interest for biodegradable implant materials because of the potential to eliminate secondary surgeries. The purpose of this study was to evaluate the *in vitro* degradation performance of the alloys after thermo-mechanical process (hot extruded and hot rolled) and to determine whether the materials are sustainable for further investigation. The performances of the Mg-1.6Gd alloys was using cell viability (MTT) test during experiment. The results showed that verified viable the osteoblast cell on all the different thermo-mechanical process and no obvious toxic effect within the various time.

Parallel Sessions IV

Date : November 9, 2018 (Friday)

Time : 13.30 – 15.00

Room-1	**:**	Sumpur
Topics	**:**	Industrial Engineering
Session Chair	**:**	Hilma Raimona Zadry, Ph.D

ID 423

An Evaluation on Dr. M. Djamil Hospital Padang Parking Lot Capacity

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Parking is an element that cannot be separated from a facility or a building, including hospitals. Dr. M. Djamil General Hospital, one of the health facilities located in Padang, should have an adequate parking space according to the standard designed for parking facilities. This research is conducted to evaluate the condition of the hospital parking facilities, started by calculating the existing capacity of the parking facility for motorcycles and cars. The next step is estimating the demand for parking spaces based on a one-week observation. Finally, the capacity is compared to the demand for parking areas. It is found that there are 319 and 551 parking spaces available for cars and motorcycles. While based on the observation, it is also known that the maximum demands are 453 and 1038 spaces for cars and motorcycles, respectively. Furthermore, the current parking layout condition has not met the standard yet. There are two improvement suggestions proposed in this study. First, additional parking lots are required, and it is designed based on the demand-capacity comparison. Second, the management of the hospital is suggested to regulate the number of vehicles that can park in the hospital parking area. The main contribution of this paper is on the parking lot design alternatives provided to the hospital.

ID 536

Designing of Welding Jig for Productivity Improvement and costsavings in Thresher's Cover Assembly : A Case Study on CV Citra Dragon Assembly Plant

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Needs for efficient assembly process has led CV Citra Dragon; a medium scale manufacturing enterpriese of agricultural machinery, to utilize welding jig for assembly one part of thresher component as their high demanding product. That component is thresher's cover that has potential for productivity improvement hence cost savings. Due to categorize as specific work-holding device for specific purpose and conditions, design processes of a welding jig has been carried out. This was resulted in development of a welding jig for assembly of thresher's cover. The design of welding jig has been evaluated from possibility to deflect during its operation and it was identified that deflection magnitude of welding jig construction was relatively low. Thus, it can infer that this welding jig can resist operational loads. Furthermore, the productivity and cost effectiveness analysis were also conducted to ensure the welding jig having fulfill the objective of the proposal. The analysis indicated that assembly process becomes efficient as welding jig deployed. It was contributed by shortening of assembly cycle times that increases production rate. In addition, affordable cost savings can also obvious especially for labour cost salary.

ID 472

Design of Ergonomic Grated Coconut Squeezer

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The use of machines with manual technology is still a mainstay for small industries, especially home industries. One of them is the activity of squeezing grated coconut that still uses hands repeatedly. Users experience musculoskeletal complaints in the hands, body and neck. The design of grated coconut squeezer has the aim to create a squeezer that provides comfort and does not cause musculoskeletal complaints. This design uses anthropometric theory to produce the product size according to the user. The anthropometric data used in the form of pulse size and standard Nordic Questionnaire (SNQ) filling questionnaire were

carried out directly. Data processing was carried out by the sufficiency test, and data uniformity, percentile calculation, fatigue analysis and statistical tests. The result of this design is an ergonomic grated coconut squeezer. Based on the statistical test Paired Sample t-Test is known the difference in pulse rate before and after using a grated coconut squeezer that illustrates the results of the device being made.

ID 503

The Effect of Regular Physical Activity and Smoking Habit on Bone Mass among Male Industrial Workers in Padang, West Sumatra: A Cross-Sectional Study

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Manufacturing industry in Indonesia plays an essential role in employing the Indonesian population. Most of the available field is work that uses manual power. Labors, especially in industry, spend most of their time in the workplace, thus, all physical activity and lifestyle of workers such as smoking habit will affect the quality of their health. Bone mass is one of the factors that affect the health quality of labors, especially for labors who work using physical energy or manual labor. This study aims to investigate the effect of physical activity and smoking habit on bone mass in male industrial labors. This research is a preliminary study to identify variables that affect bone mass and the basis for determining the weight limit for lifting activities. The study was conducted by determining physical activity and smoking habit of labors in the workplace, as well as calculating the bone mass of labors. The respondents involved were 93 male labors in Padang, West Sumatra. Questionnaires were used to determine physical activity and smoking habit of labors, while bone mass measuring devices were used to calculate labors' bone mass. Statistical tests were performed to obtain the influence on bone mass as a dependent variable, while physical activity and smoking habitas independent variables. Physical activity, as well as smoking habit, were significantly affected the bone mass ($p<0.05$) of the labors. The result shows that smoking and physical activity are factors that are correlated with bone mass status in young adults, especially for male industrial workers in Padang, West Sumatra.

ID-658
Strengthening Community Readiness to Disasters Through Songs

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A disaster could occur anytime. If it does, disasters left the shock effect to victims both physically or psychologically. Society often shock when disaster happened is because they are not ready facing the disaster dangerous. The Disaster Risk Reduction effort must be conducted and always increased. One of the effort is by giving education about characteristics of disaster and themitigation to society through the song. The review of IPTEKS aspect is new way by giving the strategic disaster education for public that include society and school. Generally, the use of education model by song are: (a) giving comprehensive and objective knowledge to the society about kinds of disaster in an area; (b) making learning facility of disaster for creating appropriate attitude and perception in facing the disaster; (c) giving the basic for evolving optimal readiness in facing the disaster; (d) creating the holistic, planned and continued learning system of disaster. So, it is very important to prepare the mitigation of disaster by song based in society.

Room-2	**:**	Ombilin 2
Topics	**:**	Mechanical Engineering
Session Chair	**:**	Dr. Eng. Jhon Malta

ID 530
The Influence of Number of solution Candidate on the Performance of Boundary Element Inverse Analysis in Detecting Rebar Corrosion

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The purpose of this research is to study the effect of number of solution candidate to the performance of boundary element inverse analysis (BEIA) that utilized for detecting corrosion of reinforcing steel/rebar in concrete. BEIA was developed by combining boundary element method (BEM) and particle swarm optimization (PSO). BEM was used to calculate the electrical potential on the whole domain of reinforced concrete. While, PSO was to optimize cost function in order to detect the rebar corrosion in concrete. BEIA was applied by using several measured electrical potential data as a reference such as from half-cell potential measurement. Numerical simulation on reinforced concrete with single rebar show that the increase of number of solution candidate would resulting in increasing the number of iterations for the solution become convergence. However, the average error from the actual solution would be smaller by increasing solution candidate number. Therefore, the number of solution candidate affect the performance of BEIA in detecting rebar corrosion in concrete.

ID 557
Corrosion Resistance of β type titanium (TNTZ) in NaCl 3% Solution

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Corrosion resistance of TNTZ in a salted environment has been done using a weight loss method. All samples were immersed in 3% NaCl solution for 2, 4, and 6 weeks. Samples consist of TNTZ (AT), TNTZ (ST), Ti6Al4V ELI, and CP-Ti. The weight of samples was measured before and after the immersion process using digital balance. Microstructure and composition of the sample surfaces were examined by using the optic microscope and EDX, respectively. The lowest corrosion rate after exposure for 6 weeks is CP-Ti while the highest one is TNTZ (AT) that is 0,003 mmpy. All microstructure of samples shows pitting and crevice corrosion in the surfaces indicating corrosion has been started to occur on the samples. It was found that the corrosion is due to the destruction of the oxide layer in some weak point as a result of chemical reaction between the metal ions with Cl- ions. Some oxides are formed in the surface of titanium as indicated by a significant increment of oxygen content is the corrosive sample surface. This study indicates the corrosion resistance of TNTZ (ST) (β type Titanium) is much better than other materials in this research.

ID 599

Atmospheric Corrosion Map of Structural Steel in Industrial Area: A Preliminary Investigation

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This paper explains the results of the initial stage of investigation of atmospheric corrosion on structural steel in industrial zones. The investigation is carried out on two shape profile of low carbon steel that are widely used for the construction of structures, namely sheet and elbow. Corrosion rate measurement process and preparation were carried out based on ASTM G-50 and ASTM G-1 standards, with a total exposure time of six months in Medan Deli District, Medan, North Sumatra. The results of this initial stage of investigation show that the average corrosion rate of low carbon steel for each profile is different, but overall it is still in the "good" category.This investigation will be continued for up to twelve months to obtain more complete data.

ID 624

Corrosion Potential of Steel Used as Reinforcer in Reinforced Concrete within Kabupaten Bireuen: Analysis of Groundwater Content used as a Concrete Mixture

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The use of groundwater as a mixture of making reinforced concrete is common in Kabupaten Bireuen, Aceh. Groundwater quality, which is very dependent on the location of the collection, will certainly greatly affect the quality of the reinforced concrete structure to be made. This research is the initial stage of investigating the relationship between the quality of concrete and water resistance as a mixture in Kabupaten Bireuen. The main focus of the study at this stage is to examine the content of chloride, sodium, sulphate and dissolved oxygen (DO) in groundwater in five selected locations in the Kabupaten Bireuen. The selected locations areGampong Paya, Gampong Teupok Teungoh, Gampong Pulo Lawang, Gampong Lhok Awe Baroh and Gampong Lhok Awe. Laboratory test results show that

chloride, sodium, sulphate and dissolved oxygen differ from location to location. Chloride content in two locations, Gampong Paya and Tumpok Teungoh, is far above the standard content set in the ASTM C 1602 M-04 standard. While three other locations, Gampong Pulo Lawang, Gampong Lhok Awe Baroh and Gampong Lhok Awe, chloride content was below the limit of ASTM C 1602 M-04. To determine the effect of chloride and other elements on the reinforcement of reinforced concrete corrosion, further research is needed.

ID 669

Corrosion Behavior of Ti6Al4V ELI Coated Bioceramics in Artificial Saliva at Fluctuating Temperatures

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Titanium and titanium alloy have been used widely in both orthopedic and orthodontic applications. Dental implant in orthodontic is utilized to replace the missing teeth through implanting them into the human jaw as a teeth root. Ti6Al4V is one of titanium alloy that has been developed as dental implant due to its mechanical strength, corrosion resistance and biocompatibility. Hidyroxiapatite is applied as coating material is significantly a solution to overcome the inert properties of Ti6Al4V and becomes bioactive. The study goal is to determine the corrosion rate of Ti6Al4V ELI coated nano-sized hydroxyapatite using electro phoretic deposition (EPD) method applying the 5 V voltage and in 5 minutes time. The implant was soaked in a solution of artificial saliva for 6 weeks at fluctuated temperature, 20°C and 60°C. The results showed that the corrosion rate decreased from 1.1413 mpy to 0.4236 mpy because of hydroxyapatite coating. In accordance thehardness properties also decreased from 318 HVN into 203 HVN. This indicated that the nano hydroxyapatite might inhibit corrosion behaviour and during corrosion process oaccured the implant was not be able to maintain its mechanical properties.

ID 649

Analysis of cutting forces and surface roughness for End mill processes of Fibre Reinforced Polimer

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This study aims to determine the cutting force characteristics when cutting composite workpieces material. Cutting force is one of the cutting conditions that can determine the machinability of the workpiece. Composites have different mechanical properties from metals thus the machinability characteristics of composites will also be different compared to metals. In this research, cutting force of two GFRP workpieces consisting of chopped strand mat and woven roving type glass fibers with resin matrix were measured using a dynamometer and recorded using DAQ then the surface quality of the workpieces were analyzed. The cutting force and surface roughness characteristics are then compared to the cutting force of Perspex and Aluminium workpieces. The results show that the average cutting force measurement (Ftm) of GFRP Chopped strand mat, GFRP woven roving, Aluminium and Perspex were 146.8845 N, 103.3915 N, 97.6002 N and 65.33 N resulting in a surface roughness of 3.8511 μm, 5.2733 μm, 6.127 μm and 6.23 μm respectively.

Room-3	**:**	Ombilin 1
Topics	**:**	Electrical Engineering
Session Chair	**:**	Dr. Eng. Rahmadi Kurnia

ID 497

Performance of Impedance Measurement Algorithm Applied in Line with Compensation Circuit

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This paper describes a performance of impedance measurement algorithms of SEL-421 distance relay protection when applied to protect series compensated line during fault conditions. The Performance is carried out by varying the value of uncertainty parameters to the accuracy of the impedance measurement algorithm of the relay for the faults which is measured from the located relay to the fault points. Experiments were carried out with a combination of DIgSILENT PowerFactory software to model and simulate electrical power protection systems with a voltage of 400 kV and a length of 300 km with compensation circuit placed in the middle of a protected transmission line. Faults simulation and performances

are performed automatically through the algorithm developed using the DIgSILENT Program Language (DPL). From the enclosed results, the developed method is applicable for testing the performance of the IEDs algorithm.

Index Terms: Transmission Line, impedance measurement, IEDs, series compensated line, distance protection.

ID 605

Improving the Quality and Quantity of Cinnamon Drying Process Using Art Cave in Lambung Bukit West Sumatra.

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Cinnamon processing in Padang constraints when processing cinnamon barks under direct sunlight due to its dependence to weather and vulnerability to dust and animals. Hence, the processors were introduced to a cinnamon drying device named Art-Cave (Smart Dryer System for Cassiavera). This machine is able to dry cinnamon barks with moisture content below 14% to prevent the mold growth, while the heating temperature allowed is 60 °C to maintain the content of aetheric oil. The machine provides four shelves that are used as storage. The capacity of each shelf is 5 kg of moist cinnamon barks. After the cinnamon barks are evenly arranged, the stove at the bottom of the machine can be switched on. The heat will flow through the room on the side of the box and the fan blows air into each shelf. On the top, a fan is installed to blow hot air out of the box. The fan functions to maintain the machine temperature on the limit of 60 °C. Therefore, the farmers are able to improve the drying process from 30 kg/day to about 80 kg/day as well as to maintain the demanded ambient temperature by utilizing the machine.

ID 500

Parametric Sensitivity Analysis of SEL-421 Distance Relay Algorithms used in Compensated Line

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This paper presents the use of Global Sensitivity Analysis (GSA) methods to analyze the sensitivity level of the performance of the impedance measurement algorithm of SEL-421 distance relay protection when used to perform transmission line protection with compensation circuit. This GSA technique was developed to see the dominance effect of system uncertainty (or factors). Two techniques that might be used for sensitivity analysis using GSA are Quasi-Monte Carlo (QMC) and data sampling with Sobol technique. Experimental is done with DIgSILEN software to do a modelling of power system, simulation and calculation of impedance and algorithm error. The testing is carried out automatically with the help of the developed using DPL (DIgSIELNT Programming Language) algorithm. SIMLAB software, in this case, (with sobol technique) is applied to generate a number of non-linear factor data and analyse the output of variations in impedance measurement errors.

ID 621
Recognition of Horizontal Gaze Motion Based on Electrooculography using Tsugeno Fuzzy Logic

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Electrooculography is a biosignal activity generated from the human's eyes activity. In this research, the eyes movements (left and right) were recognized by processing EOG signal. The eyes movements in the horizontal movement were identified from the direction and the magnitude of the gaze angle. The direction of the eyes movementswas detected using the polarity of the signal whereas the magnitude of gaze angle was computed using Tsugeno fuzzy method with two approaches, namely area of signal and peak of signal. The system was able to detect the direction of gaze motionwith the accuracy of 100%. The accuracy of the EOG signal in calculating the magnitude of the gaze angle was 93.46% forthe right and 89.88% forthe left. The number was higher compared to the performance of the peak point with the accuracy of 88.06% forthe right and 84.79% forthe left. The result in this papershowed that the system was able to detect the direction of eyes movements very well. However, the calculation of the magnitudeof eyes movements is still a challenge to be improved in the future.

ID 672

Preliminary Results on the Development of Monoester Type Insulating Oil From Coconut Oil

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Vegetable oils, both in tri-ester and monoester forms have been atractive alternative substitutes for replacing mineral oil as insulating liquid used in power transformer. An effort to develop a monoester type insulating oil derived from coconut oil has being conducted, and the preliminary results of the development are reported in this paper. Five different samples were prepared from methyl ester of coconut oil based on their melting point. The important properties of oil samples such as breakdown voltage, density, acidity, water content and viscosity were tested, and are evaluated based on the standard specification of natural ester used for transformer. Another fundamental property, i.e. oxidation stability was also tested, and is evaluated by comparing the corresponding result of mineral oil. It is found that the oil needs further treatment before being able to be used as insulating oil.
Keywords: Insulation oil, vegetable oil, mineral oil, power transformer.

ID 674

Experiment of a Two-stage Propeller Wind Turbine in a Wind Tunnel under Various Mechanical Loads

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An experiment on a two-stage wind turbine model was conducted under wind tunnel air flow. The model used a diameter of 24 cm propeller blades built by a three dimensional (3D) printing. The experiment was carried out to know the characteristics of its power coefficient under mechanical loads with various angles of attack for the blades of the two propellers used. The test used a wind tunnel with a test section width of 40 mm using wind velocity up to 5 m/s. The result showed higher power coefficients for the two-stage wind turbine compared to a normal one. Another result indicated a maximum power coefficient at a certain angle of attack used. This could be useful to choose an optimum angle of attack for the blades of the two-stage wind turbine.

Room-4	**:**	Kuantan 1
Topics	**:**	Environmental Engineering
Session Chair	**:**	Dr.Eng. Shinta Indah

ID 667
Utilization of Activated Bentonits as Adsorben Phosphor Elements Contained in WWTP Factory Palm Oil

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The purpose of this study was to determine the ability of activated bentonite to absorb Phospor (P) element contained in anaerobic pond at WWTP Palm Oil Factory. Bentonite samples were obtained in the area of Sungai Rengas Jambi Province. Bentonite was activated by using HCL 1.6 M. Characterization of bentonite using XRD and SEM-EDS instruments. The activated bentonite is added to the wastewater which has been determined by its Phospor content. The measurement of Phospor element concentration uses UVvis instrument. The results of characterization with XRD and SEM-EDS show that composed of bentonite is minerals, kaolinite, quartz and manmorrolinite. Activated Bentonite has the ability to absorb Phospor > 90%. Bentonite adsorbent that has been activated is higher than unactivated bentonite of phosphorus contained in the anaerobic pond water wastewater WWTP for Palm Oil Factory

ID 468
Fatigue Analysis to Driver of Intercity in West Sumatra Province (AKDP) A Case Study of Padang – Bukittinggi – Payakumbuh Route

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Traffic accidents are common problems in the implementation of a transportation system, including in West Sumatra Province, Indonesia. Traffic accidents that occur every year are the evidence by the number of traffic accidents that occur every year. One of the causes of traffic violations that result in accidents is the risk of

driver fatigue while working. This study analyzed the work fatigue in the driver of the Intercity in Province bus (AKDP) the scope of this study was all AKDP bus drivers with the origin of Padang City, Bukittinggi City, and Payakumbuh City. Measurement and analysis of work fatigue were using the reaction timer to light response. The results showed that increasing the number of shifts would increase driver fatigue. 33.33% of drivers run into medium fatigue level and 38.89% of drivers run into heavy fatigue level. The relationship between work fatigue and the driver's shift correlated very strongly and positively with a correlation value of r = 0.81. The owner of the company needs to take measures to improve management to minimize the level of work on this driver that has the potential to cause traffic accidents.

ID 633

Molecular Identification of lactic Acid Bacteria Potentially as Starter Isolated from Biogas Sludge Made by Cattle Feces and the Application of Biogas into Elpiji Tube

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The study was aimed to identified the lactic acid bacteria isolated from biogas sludge, made by cattle feces as raw material, that taken from two different location by using molecular technique of 16S rRNA. In addition, the research also aimed to applied the biogas into elpiji tube. Based on the result of molecular identification showed the similarity of species on three selected isolates despite in different locations. Analysis of DNA sequence and phylogenetic showed the three isolates are identified as *Lactobacillus fermentum* were recommended as starter microorganisms. The application of biogas into elpiji tube also successfully carried out with the addition of liquid nitrogen 150 ml as the best additing and has maximum pressure of 94 Psi and maximum weight of 0.55 kilograms. Biogas in elpiji tube ability using for the household fuel with maximal duration of turning on for 26 minutes. It has good fire quality with blue colored and could be directly connected to the gas stove like elpiji.

ID 668

Spatial distribution of coliform bacteria in BatangArau River, Padang, West Sumatera, Indonesia

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Batang Arau River water was sampled biweekly, during 3 successive months, and analyzed for coliform bacteria (total coliforms, TC, and faecal coliforms, FC). The results showed that the number of TC range 2.61 – 4.89 log10 number/100 mL and FC 2.48 – 4.79 log10 number/100 mL. The concentration of all parameters inspected has increased from upstream to downstream of the river, except for pH and DO. Bacterial coliforms were strongly correlated with some physicochemical parameters (TSS, TDS, EC and pH), with a Spearman correlation coefficient (r) ranged from -0.599 to 0.827. Analysis of the spatial distribution of the one-way ANOVA at 95% confidence level showed that there were significant differences ($p<0.05$) in the concentration of bacterial coliforms between upstream and downstream sampling stations as a result of differences in land use and human activity. Cluster analysis grouped 8 sampling stations into two clusters, moderate and high polluted, based on similarities of bacterial characteristics. The bacterial data clearly shows that human health is at a very high risk, as WHO guidelines classification for FC or E. coli in water supplies (WHO 1997) or for agriculture use (WHO 2006) and those strategies for improving water quality of Batang Arau River must be expeditiously implemented.

ID 655

Analysis of Water Balance Maninjau Lake West Sumatera

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Maninjau Lake area is Tanjung Raya sub-district, Agam Regency, West Sumatra Province. Geographically located at 100 ° 32'46.33 "and 0 ° 50'84.2". The research objective is to analyze the water balance of Lake Maninjau in accordance with rainfall data. The data used in this study is a land use map to see the progress of its land cover, rainfall data and lake outlet data maninjau. Rainfall value is the value of the debit calculation input using FJ Mock and ETo from the calculation of annual air temperature climatology data. Outflow data is obtained from a summary of the measurements of Lake Man hydropower from 2007 - 2017. From the analysis of

the availability of Lake Maninjau water, an analysis of water requirements and availability of water shows sufficient to meet the water needs around the lake. Where is the average lake water inflow of 174,935 m^3 / sec per year with the need for (outflow) lake water 5,593 m^3 / sec per year and the difference between the two is 169,342 m^3 / sec per year according to data from 2007 to 2017. So the capacity Lake Maninjau's water is still sufficient in number.

Keywords: hydrological data, climatology, evapotranspiration, inlet, outlet, water balance

ID 691

Critical Success Factors in Post-Disaster Reconstruction, Lesson Learnt for Reconstruction Plan

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Post-disaster reconstruction is an activity that is not easy and complex. In Indonesia, the reconstruction carried out in Aceh in the aftermath of the 2004 tsunami, Yogyakarta and Central Java in the aftermath of the 2007 earthquake, and reconstruction in West Sumatra in the aftermath of the 2009 earthquake, tended to take a long time and be ineffective. One effort that can be made to realize this is to plan a reconstruction program before a disaster occurs. The study evaluates reconstruction programs that have been carried out in West Sumatra, Yogyakarta and Aceh. The evaluation was carried out to identify the success factors and problems during the reconstruction, including the investigation of the capacity and local context that must be considered in the reconstruction program. The research was conducted by interviewing informants in the form of government, community and NGO parties. From this study, success factors and problems of reconstruction of houses after the earthquake were identified in the three reconstructions.

Room-5	**:**	Kuantan 2
Topics	**:**	Industrial Engineering
Session Chair	**:**	Dr.Eng. Desto Jumeno

ID 432
Gap Analysis between Production and Market Demand of Patchouli Oil in West Pasaman Using System Dynamic

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Patchouli oil is widely used in the production of cosmetics, perfumes, antiseptics, medicines, "flavoring agents" for food, beverages, cigarettes, and aromatherapy. In Indonesia, Patchouli oil industry has many advantages for the surrounding community if it developed adequately. As stated in data from Indonesia Statistic Center 2015, amount of patchouli oil production in West Sumatra tends to decrease for the last five years and cause low productivity of patchouli oil. This study aims to identify the supply chain, the analysis gap between patchouli oil production number and demand for the next few years using dynamics system model. System dynamics are used because of the complexity of existing systems where many factors influence the development of patchouli oil agroindustry in West Pasaman. The simulation will do from 2018 until 2025. Data for simulation consist of primary and secondary data, primary data obtained through interviews and surveys to farmers, intermediate traders, and collectors, while primary data received from the Indonesian Statistics Centre. Simulation result showed that the number of patchouli oil demands not every year able to be fulfilled by collectors. In 2018 and 2019 overseas demand has not been able to be achieved by patchouli oil production in West Pasaman, while 2020 to 2022 predicted order fulfilled well. The following year the request has not been met adequately. The number of planting areas has the positive influence on wet patchouli, which positively affects the production of patchouli oil. Patchouli oil production in West Pasaman can increase by adding patchouli planting area.

ID 657

The evaluation of bullwhip effect on distribution system of a supply chain using centralized demand information method

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Bullwhip effect is a crucial problem in a supply chain. Bullwhip effect is a distortion information between inventory and demand in the whole supply chain stages. This problem has not solved in the bussines recently. Although there are many studies discussed this issue. Bullwhip effect gives negative impact on the performance of inventory system. This impact can reduce using a method called Centalized Demand Information (CDI). This research aim to analyze the bullwhip effect that happen in between a manufacturer, distribution, and retailers in order to minimize inventory cost. This research aim is achieved by conducting these some resean objectiving, i) Calculating the amount of bullwhip effect of PT. X that occurs in the bottled drinking water distribution system. ii) Implement the centralized demand information method to reduce the bullwhip effect on the supply chain water supply network. iii) Comparing inventory costs before and after reducing the bullwhip effect on the supply chain. Study case order is a man company that produce still water. The data such as time series, data in 12 period (monthly), data on raw material procurement, holding cost and stockout costs. The resean using CDI for calculating the bullwhip effect and Economic Order Quantity (EOQ) to calculate the inventory cost. Researd findngs show that, using CDI will decreas bullwhip effect and the impact is reducing inventory cost.

ID 485

The location-allocation decision under the dynamic increment of demand for selecting the Local Distribution Centers to face Sumatra Megathrust: Study case of Padang City

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The efforts of providing an effective relief assistance in the aftermath of the disaster is prominent to prevent losses and suffering. Due to its vital role as transit point to manage large inflow and outflow of the relief commodities, the decision on locating the Local Distribution Centers (LDCs) and allocating the number of relief supplies to the selected LDCs are essential to perform a rapid-effective response.

This research proposes the location-allocation planning for encountering Sumatra Megathrust during 72 hours of the critical period. The complexities regarding to the dynamic increment of demand requirements are recognized as constraints to obtain the set of facilities with minimum total cost.In addition, the consideration on the expected impassable path is acknowledged to ensure the proper access of allocating the relief aids. This work utilizes Geographical Information Systems (GIS) with the maximum coverage analysis to generate the set of alternative LDCs per day by considering the daily required demand. The opening cost and distribution cost of each alternative LDCs is calculated to select the most appropriate LDCs with the deliberation on the least-cost result.The finding recommends two LDCs, LDC D2 and LDC G1, tobe opened in the first and second day, and three LDCs, including LDC D2, LDC E1, and LDC G1, are considered to be established in the third day with total cost 3,240 USD. The depiction of the selected depots-recipient counterparts is provided to acquire the spatialinformation of the study area.

ID 443

Evaluation Achievement of Innovation at SMEs Snacks (Case Study: SMEs of Sanjai Chips)

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This study describes the determination of innovation indicators of SMEs of West Sumatera Snack (Case Study : SMEs of Sanjai Chips) based on four dimensions of innovation. The purpose of this research is to get the relevant innovation indicators used by Snack SMEs to evaluating the achievement of business innovation. The results of the study obtained 16 relevant indicators used in Snack SMEs. Calculate importance level of dimension and innovation indicator using Analytic Hierarchy Process (AHP) method which the results explain that importance level of innovation dimension consecutive are marketing innovation, product innovation, process innovation and organization innovation. The other results show the implementation of innovation SMEs as a whole reached 33,78% from the level 100%.

Room-6	**:**	Arau
Topics	**:**	Electrical Engineering
Session Chair	**:**	Novizon, Ph.D

ID 585

Increasing the Quality and Power Capasity of HERIC PV-Inverter trough Multilevel Topology Implementation

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In photovoltaic generation applications, high efficiency and good output powerquality inverter is very important. The most common way to improve the quality of the inverter output voltage is to increase the switching frequency. However, at the same time this method will increase power losses. This paper introduces a new topology inverter: HERIC multilevel, as an inverter that has good voltage quality (low THD) with a low switching frequency. This topology was tested and analyzed by performing simulations in order to compare it with the conventional HERIC and cascaded H-Bridge inverters. The results prove that the multilevel HERIC inverter has a lower THD compared to the two inverters. At the switching frequency of 2500 Hz; Multilevel HERIC inverters have THD, 1.23%, cascaded H-bridge has 1.34% THD, and conventional HERIC THD 11.4%.

ID 610

Shape Object Selection Using Chi Square Method

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This paper is focused to identify the shape the shape of object. There are some basic shape objects such as rectangle, circle, triangle, square, hexagonal, and ellipse. The method that used in this paper was chi-square feature selection to select a relevant feature toward those basic shape objects. Then, the proximity calculation between training image and real image that was already available in the database. The chi-square feature selection process eliminates the irrelevant features in each figure that was in the image database. As final results, the system succeeds to detect an appropriate shape of object by determining the distance of Euclidean between training image and the real image.

ID 571

Partial Discharge Characteristics of Nanosilica Biopolymer under AC Voltage

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The dielectric properties of LDPE-NR biopolymeric insulation materials can be improved by adding the silica nanoparticles in a certain percentage weight into the composite. In the present study, four types of bionanopolymeric samples were prepared. To each sample, the nanosilica particles with a weight percentage of 1.5%, 3%, 4.5% and 6% a were added. To see the electrical characteristics, the effect of the electric field on the material has been tested for 1 hour. However, several factors can affect the performance of polymer materials, one of which is a defect. For several studies conducted by previous researchers, partial discharge analysis needs to be done to diagnose the degradation rate of bio-composite composites with the addition of other fillers, such as silica. Silica is one type of filler that has high electrical resistance and is resistant to thermal shock and corrosion.

ID 623

Development of Rogowski Coil Sensor for Partial Discharge Detection

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This paper presents the development of simple induction sensors, Rogowski coil sensors. The sensorsare used to measure partial discharge. The sensors need to be tested based on the number of the turns they have in reading the partial discharge signals. The sensor are connected to a digital measurement device such as a digital oscilloscope which has input impedances of 50 ohm and 1 Mohm with a timeframe duration greater than or equal to 20 ms.Rogowski coil sensor is composed of a ferrit core with a various number of turns which is 5, 10, 20 and 30 turns with half circle and full circle configuration. The reading comparison is not only between the proposed sensors but also with a commercial partial discharge sensor. The partial discharge signal is generated by a commercial charge calibrator. The measurement result shows that using low impedance lead to decreased noise but the reading is too small compared with using high impedance.