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Preface

Although in midst of Covid 19 pandemic conditions, this edition of Industrial Analysis Journal volume 14 no 2 August 2020 is still managed to publish. Thanks to continuous submission from contributors and hardwork of editor teams. This volume presents various fields of material sciences, process engineering, and transportation. Transportation engineering nowadays is among the priority programs in Indonesia, which emphasize in Infrastructures development. Material sciences are therefore very relevant in supporting this theme.

Research and studies were conducted by various institutions or individual researchers in those fields. In this edition, the journal publishes important and interesting papers about manufacturing and transportation, such as Failure analysis on Slinger Disk Pipe Of Purified Terephtalic Acid (PTA) Vessel, Exhaust Temperature Analysis Of UAV Propeller Materials, The Effect Of Abrasive Grain Shapes On Quality Of Ferrite Magnets Grinding Process, The Comparative Study Of Railway Bridge Design Load Between Pm 60/2012 And En 1991: 2-2003, Manufacturing Industrial Development Policy For Electric Propulsion System To Improve Local Content Of Railway Industry, Character Recognition For Indonesian License Plate By Using Image Enhancement And Convolutional Neural Network, Prediction Of Internal Combustion Engine Performance Using Artificial Intelligence, and *Design And Analysis Performance On 22 M Submarine Propellers*.

In this editions are published also paper on Process engineering, i.e, Design Of Biogas Cooling Processing From Pome For (CSTR) Continuous Stirred, Study On Hydrogeological Aspect Of Galang Sub-District, Batam City For Acceptance Of Prospective NPP Sites.

The editors always do their best to improve the quality of the Journal; especially now that we are heading towards an english language journal in order to increase the impact and citations. The next publication is scheduled on December 2020. As closing remarks, the editors always call for critics and suggestions to further improve this Journal.

The Editors

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FAILURE ANALYSIS ON SLINGER DISK PIPE OF PURIFIED TEREPHTHALIC ACID (PTA) VESSEL

ANALISA KERUSAKAN PIPA PIRING PELONTAR DARI BEJANA PURIFIED TEREPHTHALIC ACID (PTA)

Sukandar, Triwibowo, Yana Heryana

Abstract

Slinger disk pipe is a rotary part of PTA vessel with function as anti-fog by swinging hot water to the shell wall to remove solid PTA at the shell wall. Failure took place on this slinger disk pipe. The purpose of failure analysis is to find the root cause of failure. Methods conducted in this failure analysis are examination and testing of fractography, metallography, chemical composition, hardness, and calculation of bending stress. Examination on the fracture surface by fractographic method revealed fatigue fracture with the presence of multiple beachmarks. The position of those multiple beachmarks gave indication of alternation rotation of slinger disk pipe. Examination by metallographic method revealed that initial cracks initiated from heat affected zone of pipe and strengthening plates weld joint. However, result of chemical composition examination and hardness test showed that material of slinger disk pipe were in accordance with lean duplex 2205. Calculation of bending stress gave supporting data of various load effects to slinger disk pipe. Therefore, failure of the slinger disk pipe was caused by fatigue fracture which were initiated from head affected zone of pipe and strengthening plates weld joint.

Key Words : Slinger Disk Pipe; Purified Terephtalic Acid Vessel; Lean Duplex 2205; Fatigue Fracture; Heat Affected Zone.

EXHAUST TEMPERATURE ANALYSIS OF UAV PROPELLER MATERIALS

ANALISA PENGARUH TEMPERATUR GAS BUANG TERHADAP MATERIAL PROPELLER UAV

Suherman Mukti, Fadli C. Megawanto, Hari Artha

Abstract

This paper presents an exhaust temperature analysis of a UAV Propeller Material to maintain the performance of the propulsion system during operation, especially in a long-range condition. A pusher Propeller experiences direct contact with heat from the exhaust gas. In this study, a Beechwood material with a protective layer of corrosion prevention is used as a propeller blade that works at a range of high temperatures. An experimental methodology was carried out to analyse the strength and propeller deformation. The results of this experimental study show that conservatively the propeller will be heated to 32.9°C. Since this is below the temperature limit, the exhaust gas to pusher propeller on UAV does not affect the propeller performance.

Key Words: Exhaust; Temperature; UAV; Propeller; Wood

CAMERA-BASED DETECTORS AS AN ALTERNATIVE TO DETECT TRAINS IN A LEVEL CROSSING IMPLEMENTATION

DETEKTOR BERBASIS KAMERA SEBAGAI ALTERNATIF PENDETEKSI KERETA PADA IMPLEMENTASI PERLINTASAN SEBIDANG

Hilda Luthfiyah, Okghi Adam, Teddy Anugrah, Gilang Mantara

Abstract

Based on data from Indonesia Directorate General of Railways in 2017, it is mentioned that the problems at the level crossing of railroad tracks are mostly caused by human error factors themselves. The current train headway and the crossing system that is still operated manually can increase the potential for accidents. Therefore, the development of alternative camera-based detectors to support the railroad crossing automation system is needed at this time. The development of this camera-based train detector uses the basic program You Only Look Once (YOLO), where YOLOv3 has proven to be accurate enough to detect moving objects. The development results show promising results for several types of alternative trains.

Key Words : Detectors; Train; YOLOv3

THE COMPARATIVE STUDY OF RAILWAY BRIDGE DESIGN LOAD BETWEEN PM 60/2012 AND EN 1991: 2-2003

STUDI PERBANDINGAN DESAIN PEMBEBANAN JEMBATAN KERETA API ANTARA PM 60/2012 DAN EN 1991: 2-2003

Willy Barasa, Thiya Fiantika, Dwi Agus Purnomo, Wimpie A N Aspar

Abstract

In Referring to the government programs on the increasing speed of the Jakarta-Surabaya express train in 2017, problems arise in the field, namely the potential increase in freight transportation via the railway line where an increase in loading is required on the railway especially for the existing bridge. This Research was implemented by increasing of the loading of the standard PM 60/2012 bridge to be compared with the EN1991: 2/2003 standard. This research analyzed the increase in structural strength of the 30m span steel bridge of the BH 182 constructed in Operational Region 2 Bandung as a results of loading adjustment from PM 60/2012 to EN 1991:2/2003. This paper explained an effect caused by increasing load on railway bridges with similar span and materials on normal plane, shear plane, moment and deflection. Structural analysis and calculation was performed by means of SAP2000 software. Results of analysis showed that standard equalization of EN 1991:2/2003 caused increasing percentage of loading combination of Comb L, normal plane, shear plane, moment plane, and deflection are of 35%, 60%, 71%, and 31%, respectively. While for Comb R loading combination for normal plane, shear plane, moment plane, and deflection are of 30%, 64%, 71%, and 30%, respectively.

Keywords : PM 60 of 2012; EN1991:2-2003; SAP2000; Normal Field; Shear Field; Moment Field; Deflection.

THE EFFECT OF ABRASIVE GRAIN SHAPES ON QUALITY OF FERRITE MAGNETS GRINDING PROCESS

PENGARUH BENTUK BUTIRAN ABRASIV TERHADAP KUALITAS PROSES GERINDA FERIT MAGNIT

Bayu Rahmat Saputro, A. Suhadi

Abstract

A research was conducted on the grinding process of ferrite magnet with Strontium ferrite type (SrO6 (Fe2O3)) using electroplated single layer grinding wheels. Many cracks have been found on workpieces during this work, which was identified coming from grinding processes. Research is conducted starting from chemical composition test and the effect of the shape and size of the abrasive grain of grinding wheels to the quality of grinding process results by measuring crack ratio of the workpiece. In this experiment, 3 (three) model design of grinding wheels with three different sizes and shapes of abrasive grains are made. All of the processing parameters are set at the same value as ordinary process. The experimental results show that the 3rd model has the best results from the output's number and also the lowest reject crack ratio compared to 1st and 2nd models. This is because the 3rd model has a blocky shape which its distribution structure is denser and more uniform compared to the irregular shape so that continuous grinding on hard and brittle workpieces is more stable and suitable.

Key Words : Abrasive; Grinding wheels; Strontium ferrite; Irregular; Blocky

MANUFACTURING INDUSTRIAL DEVELOPMENT POLICY FOR ELECTRIC PROPULSION SYSTEM TO IMPROVE LOCAL CONTENT OF RAILWAY INDUSTRY

KEBIJAKAN PENGEMBANGAN INDUSTRI MANUFAKTUR SISTEM PROPULSI ELEKTRIK UNTUK MENINGKATKAN TKDN INDUSTRI KERETA API

Setyo Margo Utomo, Agus Krisnowo

Abstract

To fulfill the demand for a number of railroad products, the national railroad industry, in this case PT. INKA as a train integrator industry in Indonesia still has to import components. Local content electric train is still low. Railway propulsion systems can be classified into three groups, namely: Electric propulsion systems, Diesel Electric propulsion systems and Diesel Hydraulic propulsion systems. Import dependence, of course, cannot be allowed to continue because it will weaken the competitiveness of the national railroad industry. From the results of the analysis using the "Porter Diamond Condition" method various internal and external factors were identified through the SWOT method to formulate alternative policy formulations for the development of the railroad electric propulsion system industry in Indonesia. Qualitative SWOT data is changed to quantitative, and through calculation SWOT analysis is known with certainty the real position of the organization. From the results of the analysis, and calculations using the SWOT Method, the position of the railway propulsion system industry is in the Quadrant IV position, so it is best to use a Defensive Strategy. In this position the Company faces a very unfavourable situation, the company faces various threats and internal weaknesses. For this reason, it is necessary to prioritize strengthening strategies in the Matrix (W-T).

Key Words : Electric propulsion; Industrial development; Strategy

DESIGN OF BIOGAS COOLING PROCESSING FROM POME FOR (CSTR) CONTINUOUS STIRRED TANK REACTOR SYSTEM

DESAIN SISTEM PENDINGIN PENGOLAHAN BIOGAS DARI POME UNTUK SISTEM (CSTR) CONTINUOUS STIRRED TANK REACTOR

Endro wahju Tjahjono, Arfiana, Era Restu Finalis, Ali Nurdin

Abstract

POME (Palm Oil Mill Effluent) can be used as for biogas production, with the main content of (65%) methane gas (CH₄) and 35% Carbon Dioxide (CO₂), H₂S, and H₂O gases. Apart from being a gas fuel and a source of electricity generation, biogas from POME waste as well as a waste processor becomes more environmentally friendly (according to quality standards). In order to support the process production of biogas from POME by using Continuous Stirred Tank Reactors (CSTR), it is necessary to decrease POME's temperature to meet the requirements of the reactor operating conditions. Cooling process by using a Cooling Tower through direct contact between fluids can be a good alternative to be used as a POME cooling method because of its effectiveness in heat exchange and smaller area needed than an open ponds. The type of cooling tower used is the Induced Draft Cooling Tower. In cooling tower design, the steps involved in determining the basic design, calculation of tower dimensions, basin, fan power, losses, and cooling air requirements. Based on the calculation, the tower dimensions determine a height of 5 m, length of 3.6 m, and width of 2.5 m, while the basin cooling tower dimensions determine a height of 2.7 m, length of 3.6 m, and width of 2.5 m, fan power of 5 hp. The cooling air requirement for the POME cooling process is 82,895.14 kg/hour.

Keywords : POME; Cooling Tower; CSTR; Fuel; Biogas

CHARACTER RECOGNITION FOR INDONESIAN LICENSE PLATE BY USING IMAGE ENHANCEMENT AND CONVOLUTIONAL NEURAL NETWORK

PENGENALAN KARAKTER UNTUK PLAT NOMOR KENDARAAN DENGAN MENGGUNAKAN IMAGE ENHANCEMENT DAN CONVOLUTIONAL NEURAL NETWORK

Sahid Bismantoko, M. Rosyidi, Umi Chasanah, Adityo Suksmono, Tri Widodo

Abstract

Many Intelligent Transport System technology have been applied in real world problems such as traffic monitoring, parking management, toll collection, law enforcement. ALPR system is one of the ITS technologies that is widely applied, however this ALPR system can not produce faultless recognition yet, especially for Indonesia license plate. In this research, image enhancement and Convolution Neural Network are proposed to the character recognition. The dataset used in this research are Indonesia license plate. The first step is train dataset to recognize character and evaluate the model with recall, precision, and f-1 score from test dataset. The model achieves accuracy and loss just over 0.99 and just below 0.01 on validation dataset respectively.

Key Words : ALPR; ITS; Recall; Precision; F-1 Score; Accuracy; Loss.

PREDICTION OF INTERNAL COMBUSTION ENGINE PERFORMANCE USING ARTIFICIAL INTELLIGENCE

PREDIKSI PERFORMA MESIN MOTOR BAKAR MENGGUNAKAN KECERDASAN BUATAN

Lukman Shalahuddin, Adityo Suksmono, Yohanes P Sembiring

Abstract

The potential of artificial intelligence (AI) application for prediction of internal combustion engine performance is assessed in this paper. A literature survey on this subject is first reviewed, in which previous researches utilized the advance of artificial neural networks (ANN) as one type of AI. Previous works commonly obtained the data from experimental engine tests. Under the same engines, they varied the fuel compositions or the engine operating conditions. Whereas in this study, an ANN model is developed to calculate the inputs from an engine simulation software package database and to predict the engine performance based on the simulation software outputs as the ANN target outputs. Results from the ANN model in the "learning" step indicates good agreement with the software simulation outputs. Improvement and development of the program are required, including optimization of the ANN model architecture, such as the choice of activation function, the number of neurons in the hidden layer, and the number of iterations, as well as the number and option of input engine parameters. The ANN model seems promising to predict engine performance, with root mean square errors in the range of 0.4-1.8%.

Keywords: Artificial Intelligence; Neural Networks; Engine Performance.

DESAIN DAN ANALISA KINERJA PROPELLER KAPAL SELAM MINI 22 M DESIGN AND ANALYSIS PERFORMANCE ON 22 M SUBMARINE PROPELLERS

Mahendra Indriyanto, Taufiq A. Setyanto, Nurwidhi Asrowibowo, Navik Puryantini

Abstract

Many method approaches in designing a propeller for a 22 m submarine, that is based on the literature of propeller design that has been widely publicized, specifically the type B-series propeller. From the B-series propeller design, it can be known that the performance diagram in the form of propeller coefficient is finally correlated with the 22m submarine resistance value that has been tested at BTH-BPPT. This study objective is to produce a propeller design with good hydrodynamic aspects, especially propeller with high efficiency and cavitation phenomena does not occur on the propeller. The implementation of this research can be done by modification on the skew angle on the B-series propeller, so it is expected to choose the right B-series propeller and skew angle propeller modification, capable to provide high efficiency values and loss of cavitation in the leaf area of the propeller. The production of propeller models is needed for conducting open water test in the Towing Tank and the cavitation test in the cavitation tunnel at the Hydrodynamics Technology Center for the Agency for Assessment and Application of Technology (BTH – BPPT)

Key Word : *Design, Propeller, Cavitation*

**STUDY ON HYDROGEOLOGICAL ASPECT OF GALANG SUB-DISTRICT,
BATAM CITY FOR ACCEPTANCE OF PROSPECTIVE NPP SITES**

***STUDI ASPEK HIDROGEOLOGI KECAMATAN GALANG
KOTA BATAM UNTUK KEBERTERIMAAN CALON TAPAK PLTN***

Siti Alimah, Euis Ety Alhakim, Hadi Suntoko, Sunarko, Mudjiono

Abstract

This is a preliminary study in the selection of Nuclear Power Plant (NPP) site in Batam's Bareleng area to support industrial growth in the area in the future. The initial site selection was conducted in 2015 and 2017 in the pre-survey phase, considering hydrogeological aspect. The results of previous research showed four potential areas, namely Pasir Panjang Beach, Tanjung Batu, Dapur 3 and Tanjung Rame. The hydrogeological aspect plays an important role in the consideration of site acceptance. This is related to the consideration of potential flow of radioactively contaminated groundwater seepage in the site area, in the event of a potential release. The acceptance of the NPP site from the hydrogeological aspect is based on the site's permeable geological formation and porosity condition, where groundwater can be stored. The purpose of the study was to assess the potential site in Galang Sub-district, Batam City based on hydrogeological aspects which include surface geology, groundwater productivity and rock porosity. Research methods include primary and secondary data collection, literature review and ranking analysis. The results showed that Tanjung Batu, Dapur 3 and Tanjung Rame could be chosen as the potential sites for NPP based on the hydrogeological aspect. The three regions have surface geology in the form of sandstone, clay and claystone rock with medium rock porosity level and medium groundwater productivity. Pasir Panjang Beach is less preferable because it has a high porosity of rocks with the productivity of aquifers is being spread widely.

Key Words: Hydrogeology, Site selection, Acceptance of NPP site



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