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Kata Pengantar

Dalam situasi dan kondisi wabah pandemic COVID 19, Majalah Ilmiah Pengkajian Industri Volume 14 No. 1 April 2020 tetap berusaha untuk terbit. Terbitan edisi kali ini menampilkan beragam penelitian dan kajian bidang Teknologi Transportasi, Material dan teknologi Proses. Teknologi transportasi saat ini merupakan prioritas pembangunan di Indonesia yang fokusnya adalah mengembangkan infra struktur. Maka penelitian dan kajian di bidang ini akan sangat membantu dan mendukung terkait dengan focus pembangunan Indonesia.

Banyak penelitian dan kajian yang dilakukan oleh berbagai pihak baik berupa lembaga maupun perorangan yang bertujuan untuk memenuhi tuntutan tersebut. Pada Majalah Ilmiah Pengkajian Industri edisi kali ini memuat beberapa penelitian dan kajian menarik mengenai teknologi transportasi, dimana saat ini memang sedang direncanakan pengembangan mass transport. Disini di tampilkan penelitian tersebut yaitu : Impact Of The Jakarta – Surabaya High – Speed Train On Passengers Of The Jakarta – Surabaya Executive Train Corridor. Dan kajian terkait perkereta apian yaitu Study of Society Behavior to Early Warning In the Railway Level Crossing Without Barrier in Gayung Kebonsari, Surabaya. Dan Kajian tentang Vehicle Identification In Parking Areas Using Adaptive Brightness Thresholdin. Serta Kajian tentang Analisis Perbandingan Modul Jembatan Baja Tipe Gelagar I dan Tipe Rangka Warren untuk Kereta Api.

Pada terbitan ini juga ditampilkan topik yang terkait penelitian dan analisa yang terkait Teknologi material yaitu Fatigue And Corrosion Phenomenon On Failure Of Water Wall Tube Boiler, Pengaruh Pemuaian Panas Terhadap Kelurusan Poros Turbin Uap dan Potensi Riset dan Pengembangan FePo₄ dari Bahan Baku Lokal Fe₂O₃ di Indonesia. Ada juga penelitian tentang otomatisasi pemanfaatan biogas untuk energi : Application Of Instrumentation And Control System For Biogas Power Generation Commissioning At PTPN V Kampar Palm Oil Mill. Serta kajian tentang Analisis Teknoekonomi Penerapan Teknologi Biorefinery Pada Pabrik Kelapa Sawit.

Redaksi selalu berusaha melakukan perbaikan-perbaikan dalam rangka meningkatkan mutu Majalah Ilmiah Pengkajian Industri. Selanjutnya redaksi berencana menerbitkan Vol. 14 No. 2 bulan Agustus 2020. Redaksi sangat mengharapkan adanya kritik dan saran yang sifatnya membangun.

Redaksi

Majalah Pengkajian Industri

- Impact Of The Jakarta – Surabaya High – Speed Train On Passengers Of The Jakarta – Surabaya Executive Train Corridor. (Djoko Prijo Utomo, Prasetyaning Diah Rizky Lestari, Sucipto Sucipto, Asep Yayat Nurhidayat) 1 - 10
- Vehicle Identification In Parking Areas Using Adaptive Brightness Thresholdin (Mohammad Rosyidi, Sahid Bismantoko, Tri Widodo) 11 – 20
- Application Of Instrumentation And Control System For Biogas Power Generation Commissioning At PTPN V Kampar Palm Oil Mill. (Arya Bhaskara Adiprabowo, Bambang Muharto, Hana Nabila Anindita, Nur Azimah Salehah) 21 – 28
- Fatigue And Corrosion Phenomenon On Failure Of Water Wall Tube Boiler (Eka Febriyanti, Amin Suhadi, Laili Novita Sari) 29 – 38
- Study of Society Behavior to Early Warning In the Railway Level Crossing Without Barrier in Gayung Kebonsari, Surabaya (Adita Utami, Hera Widyastuti) 39 – 46
- Analisis Perbandingan Modul Jembatan Baja Tipe Gelagar I dan Tipe Rangka Warren untuk Kereta Api. (Dwi Agus Purnomo, Djoko Prijo Utomo, Agung Barokah Waseso, Mira Marinda) 47 – 58
- Analisis Teknoekonomi Penerapan Teknologi Biorefinery Pada Pabrik Kelapa Sawit (Edi Hilmawan) 59 – 70
- Pengaruh Pemuaian Panas Terhadap Kelurusan Poros Turbin Uap. (Dwijaya Febriansyah, Barman Tambunan, Rudias Harmadi, Budi Noviyantoro Fadjrin) 71 – 76
- Potensi Riset dan Pengembangan FePo₄ dari Bahan Baku Lokal Fe₂O₃ di Indonesia (R. Ibrahim Purawiardi) 77 - 86

IMPACT OF THE JAKARTA – SURABAYA HIGH – SPEED TRAIN ON PASSENGERS OF THE JAKARTA – SURABAYA EXECUTIVE TRAIN CORRIDOR

PENGARUH KERETA CEPAT JAKARTA – SURABAYA TERHADAP PENUMPANG KERETA EKSEKUTIF KORIDOR JAKARTA – SURABAYA

Djoko Prijo Utomo^a, Prasetyaning Diah Rizky Lestari^a, Sucipto^a, Asep Yayat Nurhidayat^a

Abstract

Due to increasing travel of demands by trains in recent years, a large potential number of passengers for Jakarta - Surabaya corridor needs to be anticipated with adequate transportation system planning so that constraints on available transportation network system can be minimized. This paper analyses potential competition between demands of executive train passengers and Jakarta - Surabaya high - speed train passengers. This paper used travel time variables and ticket rates as independent variables between executive train passengers and high - speed train passengers. Therefore, stated preference methods and binomial logit models were used as tools for processing data. As a result, it is believed that the operation of Jakarta - Surabaya high - speed train would have a negative impact on the demand of executive train passengers on the same route.

Keywords : High - speed Train; Mode Choice; Stated Preference; Binomial Logit Model

VEHICLE IDENTIFICATION IN PARKING AREAS USING ADAPTIVE BRIGHTNESS THRESHOLDING

IDENTIFIKASI KENDARAAN DI AREA PARKIR MENGGUNAKAN METODE AMBANG BATAS KECERAHAN YANG ADAPTIF

Sahid Bismantoko^a, M. Rosyidi^a, Asep Haryono^a, Tri Widodo^a

Abstract

The problem of parking systems on the street is a classic problem that occurs from year to year, many solutions are offered in solving the parking problem on the street. The problem is not only related to traffic jams due to in and out of vehicles from the parking spaces but also the parking management issues become polemic at this time. A prototype of parking management monitoring system tries to provide solution in managing parking by using image processing based smart camera. In a prototype the system test performed on day and night conditions, to anticipate the very contrast difference intensity of pixels during the day or night so as to develop vehicle detection program using adaptive brightness thresholding. The results show that the program has been running quite well to identify vehicles during day and night timeframe.

Key Words : Image Processing; Deep Learning; CNN; VPN; Motorcycle; Smooth Traffic

**APPLICATION OF INSTRUMENTATION AND CONTROL SYSTEM FOR
BIOGAS POWER GENERATION COMMISSIONING AT PTPN V KAMPAR
PALM OIL MILL**

**APLIKASI SISTEM PENGUKURAN DAN KONTROL PADA UJI COBA
PEMBANGKIT LISTRIK TENAGA BIOGAS DI PABRIK KELAPA SAWIT PTPN
V KAMPAR**

Arya Bhaskara Adiprabowo, Bambang Muharto, Hana Nabila Anindita, Nur Azimah Salehah, Dwi Husodo Prasetyo, Samuel Pati Senda, Muhamad Rodhi Supriyadi, Nesha Adelia, Bayu Samodra

Abstract

Biogas Power Plant (PLT) from palm oil mill effluent had been commissioned by a team from the Center of Technology for the Energy Resources and Chemical Industry, Agency for the Assessment and Application of Technology (PTSEIK-BPPT). The biogas power plant is located in PTPN V Kampar, Riau Province. A PLC (Programmable Logic Controller) has been implemented to support the operation of biogas power plant. Proper sensor selection has been done for each measurement applications. A computer and mimic panel are used as an interface for the operation of PLC. The master control system communicates with the slave control systems and Human Machine Interface (HMI) by means of ethernet communication protocol. Commissioning phase is carried out for 2 hours with a load of 450 kW. Some process variable in biogas, such as fluctuation in methane concentration, pressures, and flow rate is measured in order to check biogas supply suitability with gas engine specification.

Key Words : Biogas Power Plant, Palm Oil Mill Effluent, Measurement and Control System, and PLC

**FATIGUE AND CORROSION PHENOMENON ON FAILURE OF WATER WALL
TUBE BOILER**

**FENOMENA FATIK DAN KOROSI PADA KERUSAKAN PIPA KETEL UAP
BAGIAN WATER WALL**

Eka Febriyantia, Amin Suhadia, Laili Novita Saria

Abstract

Water wall tube is one component of a steam boiler which has a function to transform water to vapour, and hence it is commonly called the steam generating tubes. Any failures on the wall tube will affect the whole boiler system. The purpose of this research is to find out root the cause of failures of a wall tube in order to avoid similar case in the future. The research was conducted by examining and testing the specimens on various aspects including visual, fractography, metallography, chemical analysis, hardness test and tensile test. Examination on the fracture surface by fractographic method found the evidence of fatigue fracture with the presence of beach mark. Another examination on uninstalled boiler tube showed indication of fabrication defect and trans-granular cracks which allowed corrosive agent infiltrated into the microstructure of the tube. However, the result of chemical analysis and tensile test indicated that the tubes investigated were in accordance with ASTM A 210 Grade C specifications. Therefore, the failure of the tube was not caused by wrong material selection, but rather by combination of fatigue fracture and corrosion attack which were initiated at fabrication defect that subsequently acted as stress raisers.

Key Words: Water wall; Tube boiler; Fabrication defect; Fatigue; Crack; Corrosion

**STUDY OF SOCIETY BEHAVIOUR TO EARLY WARNING IN THE
RAILWAY LEVEL CROSSING WITHOUT BARRIER IN GAYUNG
KEBONSARI, SURABAYA**

***STUDI PERILAKU MASYARAKAT TERHADAP EARLY WARNING
PADA PERLINTASAN SEBIDANG TANPA PALANG PINTU DI GAYUNG
KEBONSARI, SURABAYA***

Adita Utami, Hera Widyastuti

Abstract

Railway level crossing safety is one of the most critical issues for railways. Collisions between trains and motorized vehicles contribute most to LX accidents. Population growth and the development of economic in Indonesia affect the increase in vehicle volume, especially in the city of Surabaya. Furthermore, the increasing of vehicles volume, causing congestion at some points in Surabaya including Gayung Kebonsari railway level crossing. One of the congestion factors at the railway level crossings is the duration of closing time as the train passes through the crossing. The uncertain duration of gate closing time cause road users to be undisciplined by break through the crossing gates while the train pass through the crossings. Considering of those problems, respondents' opinion is being evaluated to see the society behaviour to early warning on reducing the number of traffic violation. A comprehensive discussion of the existing problems, lessons learned and the possible future implications that can be applied in Indonesia are presented.

Key Words: Railway Level Crossing, Accident, Society Behaviour, Regression, Binary logit

**COMPARISON ANALYSIS OF RAILWAY BRIDGE MODUL FOR “I” GIRDER
TYPE AND “WARREN” TRUSS TYPE**

***ANALISIS PERBANDINGAN MODUL JEMBATAN BAJA KERETA API TIPE
GELAGAR “I” DAN TIPE RANGKA “WARREN”***

Dwi Agus Purnomo, Djoko Prijo Utomo, Agung Barokah Waseso, Mira Marinda

Abstract

The railway bridge in Indonesia, with a width of 1067 mm, was built in 1878, so that maintenance modules are needed to repair or to replace of construction modul at regular intervals. Implementation of maintenance and repairs refers to the Minister of Transportation Regulation No. 60 of 2012. Problems were encountered in the field at the BH182 Daop 2 railway bridge in Bandung due to lowering structural strength. Therefore, it was necessary to repair the bridge module with a new bridge design. The purpose of this study is to analyse and to calculate strength of the structure and to determine effectiveness of the use of construction materials on 2 alternative bridge construction selection with the type of “I” girder and the type of “Warren” Truss. Design implementation method used is to utilize Midas Civil Structure software. The loading used for railway bridges is grouped into three load groups, namely the girder's self-weight, additional dead load, and live load. Additional dead load analysed is line load including bearings, while for live load is trainset load based on loading requirements. From the results of calculations between the steel bridge “I” girder type height of 300 cm and the type of “Warren” Truss height of 600 cm, each span of 30 m showed that those were a function of the railway bridge. It would be more effective to use the type of “Warren” Truss structure that is quite able to withstand train traffic loads in accordance with applicable standards.

Keywords: Load; Railway Bridge; PM 60/2012; SNI 2833:2016; Load Standard; Load Type; Load Combination.

ANALISIS TEKNO-EKONOMI PENERAPAN TEKNOLOGI *BIOREFINERY* PADA PABRIK KELAPA SAWIT

TECHNO-ECONOMIC ANALYSIS ON IMPLEMENTATION OF BIOREFINERY TECHNOLOGY IN PALM OIL MILL

Edi Hilmawan^a, Ati Widiati^a, Ayu Lidie Febriyani^a, Ratna Etie Puspita Dewi^a

Abstrak

Penerapan teknologi *biorefinery* pada Pabrik Kelapa Sawit (PKS) melalui pemanfaatan kembali dan daur ulang limbah atau produk samping, dapat meningkatkan efisiensi proses serta nilai tambah dari diversifikasi produk. Dalam studi ini dilakukan kajian tekno-ekonomi peluang penerapan teknologi *biorefinery* pada PKS dengan kapasitas terpasang 45 ton-TBS per jam, yang berlokasi di Riau. Opsi teknologi *biorefinery* yang dikaji ada 4 skenario, yaitu: (a) Skenario 1: PLT Biogas + Pabrik Pellet, (b) Skenario 2: PLT Biogas + Pabrik Kompos, (c) Skenario 3: Biogas Cofiring dan (d) Skenario 4: Biogas Cofiring + *Activated Carbon*. Hasil analisa tekno-ekonomi menunjukkan bahwa keempat opsi teknologi *biorefinery* di atas, layak untuk diterapkan di PKS. Instalasi PLTBg dapat menghasilkan listrik yang lebih murah daripada PLN, sehingga teknologi pellet maupun kompos memiliki kelayakan finansial yang cukup menarik. Skenario biogas cofiring sangat tergantung pada harga cangkang yang digantikan sebagai bahan bakar. Proyek secara tekno-ekonomi menjadi tidak layak, ketika harga cangkang di bawah Rp 500/kg. Untuk PKS yang sudah terpasang sistem PLTBg, direkomendasikan untuk mengaplikasikan pabrik pellet ataupun kompos memanfaatkan listrik dari PLTBg. Sedangkan yang belum terpasang sistem PLTBg, dapat dipertimbangkan untuk memanfaatkan biogas sebagai bahan bakar boiler, sehingga dapat menghemat cangkang yang memiliki nilai jual tinggi di pasar.

Kata kunci : *Zerowaste*; *Biorefinery*; Tekno-ekonomi; Pabrik Kelapa Sawit

INFLUENCE OF THERMAL EXPANSION ON STEAM TURBINE SHAFT ALIGNMENT

PENGARUH PEMUAIAN PANAS TERHADAP KELURUSAN POROS TURBIN UAP

Dwijaya Febriansyah^a, Barman Tambunan^a, Rudias Harmadi^a, Budi Noviyantoro Fadjrin^a

Abstract

Most of failures occurred in rotating machines, including steam turbines, are caused by shaft misalignment. In the steam turbine, heat that propagates to the casing can change steam turbine dimension due to thermal expansion which affects the shaft alignment. Thermal expansion values need to be known as one of the specifications in shaft alignment setup. In this study, thermal expansion on 3 MW steam turbine was investigated by measuring the shaft alignment in hot after shut down and cold condition using laser alignment method. Results show that thermal expansion has an influence on shaft alignment due to difference of alignment values when hot and cold conditions, namely 0.025 mm (gap) and 0.071 mm (offset.) in vertical plane then -0.025 mm (gap) and -0.069 mm (offset.) in horizontal plane.

Keywords: Steam Turbine; Thermal expansion; Shaft alignment

**POTENSI RISET DAN PENGEMBANGAN FePO_4
DARI BAHAN BAKU LOKAL Fe_2O_3 DI INDONESIA**

***THE POTENCY OF FePO_4 RESEARCH AND DEVELOPMENT FROM Fe_2O_3
LOCAL SOURCE IN INDONESIA***

Ibrahim Purawiardi

Abstrak

Riset dan pengembangan baterai lithium mulai banyak dilakukan di Indonesia sejak awal dekade 2000-an. Diantara salah satu material yang dikembangkan adalah bahan aktif katoda LiFePO_4 , dengan harapan bahwa seluruh bahan baku pembuatan LiFePO_4 diperoleh dari sumberdaya lokal. Sumber-sumber bahan baku LiFePO_4 sendiri adalah LiOH atau $\text{LiOH}\cdot\text{H}_2\text{O}$ atau Li_2CO_3 atau CH_3COOLi sebagai sumber Li, Fe_2O_3 sebagai sumber Fe, dan H_3PO_4 sebagai sumber PO_4^{3-} . Diantara berbagai sumber bahan baku tersebut, Fe_2O_3 dan H_3PO_4 dapat diperoleh dari dalam negeri, namun sumber lithium masih harus impor. Oleh sebab itu, produksi LiFePO_4 kedepannya tidak akan dapat 100% menggunakan bahan baku lokal. Namun, terdapat satu cara yang dapat dilakukan agar menggunakan 100% bahan baku lokal, yaitu pengembangan FePO_4 . FePO_4 ini nantinya berpotensi untuk diproduksi dan diekspor sebagai bahan baku pembuatan LiFePO_4 . Disamping itu, FePO_4 juga memiliki nilai tambah lain sebagai bahan pelapis pencegah oksidasi pada permukaan logam. Oleh sebab itu, material ini cukup strategis untuk dikembangkan di Indonesia.

Kata kunci : FePO_4 ; prospek riset dan pengembangan; Fe_2O_3