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Name	Affiliation
Dr. Ir. Rizkon Fajar,	Center for System Technology and Infrastructure Transportation, Technology building II (251), 3rd floor, Serpong, South Tangerang, Banten 15314
Dr, Ir. Eko Syamsudin,MSc	Center for System Technology and Infrastructure Transportation, Technology building II (251), 3rd floor, Serpong, South Tangerang, Banten 15314
Dr. Ir. Lukman salahuddin, MSc.	Center for System Technology and Infrastructure Transportation, Technology building II (251), 3rd floor, Serpong, South Tangerang, Banten 15314
Dr. Cuk Supriyadi Ali Nandar ST., M.Eng.	Center for Materials Technology Building 224 PUSPIPTEK, Serpong, South Tangerang, Banten 15314
Dr. Dipl. Ing. Mulyadi Sinung Harjono, M.T	Center for System Technology and Infrastructure Transportation, Technology building II (251), 3rd floor, Serpong, South Tangerang, Banten 15314
Dr. Ir. Suryadi	Center for Materials Technology Building 224 PUSPIPTEK, Serpong, South Tangerang, Banten 15314
Amin suhadi	B2TKS, Building 256 PUSPIPTEK, Serpong, South Tangerang, Banten 15314
Dwi Phalita Upahita, Ph.D	Center for System Technology and Infrastructure Transportation Technology building II (251), 3rd floor, Serpong, South Tangerang, Banten 15314
Muhammad Penta Helios S.T., M.T.	Center For Thermodynamics And Motors And Propulsion, Building 230 PUSPIPTEK, Serpong, South Tangerang, Banten 15314

Preface

Last **Journal of Industrial Research and Innovation** Volume 16 No 3 December 2022 edition is still performed to publish. This volume presents various fields of transportation and material sciences. 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. Thanks to continuous submission from contributors and hardwork of editor teams.

Research and assessment were conducted in this journal by various institutions researchers in those fields. In this edition, the journal publishes papers related to transportation engineering, such as: Study of Pedestal Column Foundation of Heater Structures After a Fire Accident. Design and Testing of a Bungee Cord Based Launcher for LSU-02 UAV. and Congestion Cost Analysis and Potential Loss of Private Vehicle on Jalan Jenderal Sudirman, Jakarta.

The others paper published is about materials engineering: Chip Formation Analysis of the Turning of ST41 Steel. And about enrgy: Energy, Exergy, and Externalities Cost Rate Analysis of 300 MW Coal-Fired Power Plant: A Case Study.

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 with new appearance on April 2022. As closing remarks, the editors always call for critics and suggestions to further improve this Journal.

The Editors

Majalah Ilmiah Pengkajian Industri
(Journal of Industrial Research and Innovation)

Study of Pedestal Column Foundation of Heater Structures After a Fire Accident

Tri Handayani, Puguh Triwinanto

Abstract

This paper has presented the study of concrete experiencing the fire of the pedestal column of the heater foundation structure after the fire accident. The evaluation was done with the analytical method, which was conducted to find out the actual condition of an existing structure. Structure or components of the structure are categorized as a safe condition; if its design strength is greater or equal to the required strength or ØRn ≥ Ru. Evaluation of the pedestal column structure with the analytical method was done by visual inspection, concrete quality inspection, cracking depth inspection, structural analysis with the finite element software and strength calculation of structure according to the requirement of SNI 2847 2013. The equipment used for concrete quality inspection is Digischmidt Hammer and PUNDIT. The result showed that there was a degradation of the concrete quality of less than 15%. However, with this condition, all of the pedestal column structures are still in a safe condition in receiving the load operation.

Keywords: Concrete experiencing a fire, Concrete evaluation, Pedestal column, Required strength, Design strength

Energy, Exergy, and Externalities Cost Rate Analysis of 300 MW Coal-Fired Power Plant: A Case Study

Muhammad Penta Helios, Achmad Maswan, Riki Jaka Komara, Himawan Sutriyanto, Bhakti Nuryadin, Ade Andini

Abstract

Three types of analysis conducted at one of Thailand's coal-fired power plants were reported in this paper. The analyses consisting of energy, exergy, and externalities cost rate analysis are aimed to analyse the largest energy loss and exergy destruction that occurs in the system, to assess the contribution of Energy externalities cost rate based on fuel price, and to determine potential cost saving. Energy loss at the condenser was the highest among major units of the Thai power plants, which contributed around 49.11% at full load condition and was followed by a boiler, turbine, etc. Furthermore, the boiler was identified as the highest exergy destruction producer, with around 57.73% of total exergy input into the system, followed by turbines, heaters, etc. Moreover, the energy and exergy efficiency of Thai's power plant was calculated to be around 35.60% and 31.76%, respectively. The highest externalities cost rate due to energy loss occurred in the condenser was about 0.56 $/s, whereas the highest externalities cost rate due to exergy destruction identified in the boiler was about 0.67 $/s. By improving boiler and turbine components, Thai's PP has a potential cost saving of around 21.2 million $/year, reducing 88.44% of the externalities cost of exergy destruction

Keywords: Energy loss, Exergy destruction, Externalities cost rate, Potential saving cost.

Design and Testing of a Bungee Cord Based Launcher for LSU-02 UAV

Ari Sugeng Budiyanta, Fuad Surastyo Pranoto, Andreas Prasetya Adi, Agus Wiyono

Abstract

The LSU-02 is one of the unmanned aerial vehicles (UAVs) developed by LAPAN (now BRIN). It has a good endurance and flight range, i.e., it can fly for four hours and up to 200 km. However, the UAV needs a good and long runway to do the takeoff and landing operations. In real missions, sometimes it is hard to find the proper runway. Therefore, a method for taking-off without a runway, namely using a launcher, is required. The two most frequently used launcher systems are pneumatic launcher and bungee cord launcher. However, based on our experience using the launcher for LSU-03 UAV, a pneumatic launcher is considered less practical due to its complex and heavy construction. For the LSU-02 to be able to carry out missions in remote areas, a simpler and lightweight launcher is needed. Therefore the bungee cord-based launcher was chosen. The initial requirement for the launcher is that the launcher should able to push the LSU-02 with a maximum takeoff mass of 15 kg put on a 7 kg cradle (total mass 22 kg) and reach the launch speed of 15.2 m/s at the end of launching track. The simulation result shows that the launcher needs a time of 0.28 s to achieve a velocity of 15.2 m/s. Meanwhile, in 0.28 s, the UAV travel distance is 2.55 m. This is the minimum effective length re-quired by the launcher. The real launcher was built with an effective length of 2.7 m. The launcher was tested for launching the LSU-02 with the UAV takeoff mass of 14.4 kg and the cradle mass of 7.5 kg (total of 21.9 kg). It was able to successfully launch the LSU-02 in 0.27 s with a travel distance on the launching rail of 2.5 m.

Keywords: Bungee cord, Design, Launcher, LSU-02, Testing, UAV.

Congestion Cost Analysis and Potential Loss of Private Vehicle on Jalan Jenderal Sudirman, Jakarta

Adita Utami, Cut Lutfiah Zulfa, Asep Yayat Nurhidayat

Abstract

In recent years, many big cities have experienced congestion in the world, including DKI Jakarta. Rapid economic growth has led to high demand for travel in the City, and rapid urbanization is one of the causes of traffic congestion. Traffic congestion is a characteristic of urban areas caused by increased economic activity, increased productivity of population movement, and inadequate facilities. Traffic congestion causes lost travel time, losses due to vehicle emissions, and increases traffic accidents. This study discusses the amount of costs incurred by vehicle users who pass Jenderal Sudirman street when experiencing congestion. This study aims to provide an overview for private vehicle users of the amount of costs incurred when using a private vehicle when passing Jenderal Sudirman street. The method used in determining Vehicle Operational Costs (VOC) is a method developed by the Institute for Affiliation and Research and Industry (LAPI) ITB 1997, while getting lost costs due to congestion is reviewed based on VOC and time value with the Income Approach method. The results show a high difference in operational costs and the loss of time value which is the total cost loss due to congestion on the road.

Keywords: Congestion, Vehicle operating Cost, Lost Costs, Income approach

Chip Formation Analysis of the Turning of ST41 Steel

Rieza Zulrian Aldio, Muhyi Wahid Saputra, Dedikarni

Abstract

ST41 steel is commonly used for the shaft of ships. The shaft tends to corrode due to the interaction with the water. To recycle the used ST41, welding is normally done to repair the damaged or rusted surface of the shaft. The turning process is then conducted to obtain a better surface finish. This research used three types of cutting tools with different geometry at their cutting angle of 80º, 85º, and 90º. The chips from the turning process are collected and observed. Chip formation will indicate the quality of the turning process. The chip thickness and formation are observed to determine the effect of the cutting angle on the machining quality. The chip thickness value ranges between 0.13 mm to 0.3 mm, with a cutting angle of 90º producing the thinnest chips and 85º producing the thickest chips. Thicker chips indicate higher cutting force that leads to the wear of cutting tools. The cutting angle also affects obtained the chip formation. Several shapes are obtained, such as long continuous, medium, and short discontinuous shapes. A longer chip means a better process with less chatter on the cutting process. Long continuous chips are dominantly found by using 90º cutting tool. The other two angles are dominated by the discontinuous chips, with a slightly medium length of chips majorly found at 80º and short discontinuous chips recovered using an 85º cutting tool. From this research, it could be known that a 90º cutting angle will produce thinner and better chip formation.

Keywords: Chip formation, Chip thickness, Cutting angle, Turning.