APPLICATION OF TEMPERATURE CONTROL SYSTEMS AT THE CATALYST ACTIVATION STEP IN THE METHANOL TESTPLANT

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Abstract

Catalyst activation is an important step in methanol synthesis process, achieved by the reduction of CuO precursor producing Cu^0 active sites. Testplant's temperature operation shall be maintainted at 220°C in order to maximize the CuO reduction process in the catalyst activation step. A temperature control system shall be applied in methanol testplant to maintain the temperature during reduction process, due to sensitivity of reduction process to temperature variation and possibility of disturbance such as change in gas flow rate which could affects the operating temperature. Temperature control systems are tested by using step response at the desired setpoint, which is 220°C at pre-heater and reactor and 60°C at sampling line. The tests are conducted by changing the setpoint value at temperature controller and previously stable flow gas in the system (disturbance rejection). The temperature control system proved to be able to response well during the test. In the end, methanol is produced from syngas, indicating catalyst activation success.

Keywords*:* Catalyst Activation; Methanol Testplant; Temperature Controller

OPTIMATION OF FIRE EXTINGUISHMENT SYSTEMS IN X STATION CENTER OF CRUDE OIL AND GAS STORAGE

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ABSTRACT

This paper discusses some research results that were carried out to optimize the fire extinguishment system of X Station in South Sumatera. To optimize the fire extinguishing system at station X, a system modification has been done, which included: changes in the number of stockpile tank units, changes in capacity and dimensions of oil tanks, and changes in fire wall construction. With the change in capacity and dimensions, especially the storage tank unit, it is necessary to recalculate whether the water demand in the fire protection system is still sufficient according to the existing system condition. From this research, it can be concluded that the maximum flow rate of foam under the existing condition is 1631.6 gpm while the optimum condition is 65% smaller than the existing system condition at 570.54 gpm. The cooling water flow rate of 615.09 gpm at optimum condition is lower than the existing system conditions of 1409.33 gpm. The required water to the fire extinguishment system is 250 gpm; this value is smaller than the existing system capacity of 2074 gpm. By using performance curves of Grundfos Data Booklet, for the capacity of pump 1250 gpm, the total head pump and pump efficiency are obtained 103.48 m and 77.5 %, respectively.

Keywords: Optimation; Tank; Water; Foam; Pump

ANALYSIS OF SPOT-WELDING PITCH ON TOP HAT STRUCTURE AGAINST CRASHWORTHINESS CRITERIA

Harry Purnama, Jos Istiyanto

Abstract

The application of spot-welding in the automotive industry, especially the electric-based vehicle frame structure, has been optimized to meet passenger and battery compartment safety factors. The present numerical study of the electric-based vehicle frame structure with the top hat cross-sectional model validated the experimental results of reference, which then modified the spot-welding pitch to determine the crashworthiness effect and criteria. The numerical simulation results show that reducing spot-welding pitch in vertical direction can increase energy absorption (EA) by 1.70% - 9.91%, while bringing spot-welding pitch closer to the flange's outer edge can reduce its maximum force (Fmax) by 8.11% - 21.67%.

Keywords: Spot-welding; Top Hat Structure; Crashworthiness; Numerical Simulation; Electric Vehicle.

A COMPARISON PRE-TRAINED MODELS FOR AUTOMATIC INDONESIAN LICENSE PLATE RECOGNITION

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Abstract

Automatic License Plate Recognition is related to the Intelligent Transportation System (ITS) that supports the road's e-law enforcement system. In the case of the Indonesian license plate, with various colour rules for font and background, and sometimes vehicle owners modify their license plate font format, this is a challenge in the image processing approach. This research utilizes pre-trained of AlexNet, VGGNet, and ResNet to determine the optimum model of Indonesian character license plate recognition. Three pre-trained approaches in CNN-based detection for reducing time for a build if model from scratch. The experiment shows that using the pre-trained ResNet model gives a better result than another two approaches. The optimum results were obtained at epoch 50 with an accuracy of 99.9% and computation time of 26 minutes. This experiment results fulfil the goal of this research.

Keywords: ALPR; ITS; CNN; AlexNet; VGGNet; ResNet

FATIGUE LIFE ANALYSIS OF RAMP DOOR FERRY RO-RO GT 1500 USING FINITE ELEMENT METHOD

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Abstract

Ro - Ro Ferry is equipped with a connecting door between the port and the ship. The ramp door experiences load during loading and discharging of the rolling cargo. This repetitive load may cause fatigue failure. The structure of the ramp door should withstand this load. Therefore, The ramp door should be properly designed to ensure the structural integrity of the ramp door. The purpose of this research is to analyze the maximum stress and the Fatigue life of the bow ramp door. The method used is the finite element method. The given loads are several types of vehicles that are commonly transported by the ship. The given load case is the point load working at the girder plate and between the girder plate. Based on the simulation results with the given point load, the maximum stress is identified located between the girder for the large truck case with 397.02 MPa, while the minimum stress located at the girder for sedan car with 43.93 MPa. As for the fatigue life of the bow ramp door construction. it is 1.17 ~ 398.64 years, and the load cycle is 5.35 x 10^4 ~ 9.05 x 10^6 cycle.

Keywords: Bow Ramp Door; Stress; Fatigue Life; Finite Element; Ferry

DOMESTIC COMPONENT LEVEL ASSESSMENT FOR A SALT FACTORY AND A SALT PRODUCTION

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Abstract

The TKDN (Domestic Component Level) assessment of goods and services is a method to determine local manufacturers/industries' capability to create quality products internationally standardized. This study assessed the salt factory's TKDN to increase the NaCl content, based on cost-based analysis stipulated at the Minister Industry Regulation No.16/M-IND/PER/2/2011. Meanwhile, the TKDN of salt production was assessed based on process-based analysis stipulated in Minister Industry Regulation No.16/2020. According to the cost-based analysis results, the goods and services at the pilot project stage had the TKDN value of 27.4%. However, due to an increase in the number of main domestic components at the commercial stage, this value increased to 70.9%. Meanwhile, according to the processed-based analysis results, the salt production had the same processes at the pilot project stage and commercial stages. The TKDN value of 85.5% was obtained for the two stages. The value is relatively high because the raw material is produced locally with the local labor and used work tools owned by the local industry. The cost-based analysis was found to be highly dependent on the equipment components' origin, while the process-based analysis depends on the origin of labor, works tool, and material owner.

Keywords: domestic component level; process-based analysis; cost-based analysis; salt factory; salt product.

DEVELOPMENT OF HVAC SYSTEM FOR MBSL-2 TFRIC BPPT

For the Comfort and Safety of Testing Personnel and the Safety for the Analysis Process and for the Environment from Exposure to SARS-CoV-2 Virus Contamination

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Abstract

Tracing, tracking and testing are keys in fighting COVID-19 pandemic. At the start of the pandemic in Indonesia, the capacity to test with RT-PCR methods as the golden standard was still quite low. BPPT, through TFRIC-19, developed MBSL-2 to increase the capacity of Covid-19 PCR Test. This Mobile Bio-Safety Level-2 (MBSL-2) is equipped with HVAC system which has the main function of providing comfort and safety for testing personnel as well as safety for the testing process. This MBSL-2 also provides safety for the environment in which MBSL-2 is placed from contamination of the SARS-CoV-2 virus which may be released during the PCR analysis process. There are several variants of the Heating, Ventilating and Air Conditioning (HVAC) MBSL-2 that have been built and operated. The requirement and the design result for MBSL-2 has been discussed in this paper. This HVAC system has to be able to cover cooling load of 2459 W. This MBSL-2 HVAC system has been designed to complement the RT-PCR testing facility that is safe for the personnel, environment and testing result from contamination. This MBSL-2 has been proved to be safe in the operation during this pandemic.

Keywords: PCR Test; HVAC; COVID-19; MBSL-2, BSL-2

A VEHICLE ROUTING PROBLEM OPTIMIZATION WITH DRONE USING TABU SEARCH ALGORITHM AND ANALYTICAL HIERARCHY PROCESS

Linda Nuryanti

Abstract

This research presents optimization of the fastest route using Drone, Vehicle Routing Problem with Drones (VRPD) is used for planning the mapping of areas with minimal makespan. Drone point route design aims to mapping the area with considering the boundaries. In this paper, an optimization method using the Tabu Search algorithm and Analytical Hierarchy Process (AHP) to resolve VRPD problems is proposed. Tabu Search algorithm is suitable for the implementation of Vehicle Routing Problem because it is able to find the closest distance optimally with guiding other processes using a series of movements to change one solution to another. The optimization process using Tabu Search can find a suitable pair of points so that the closest route can be found. AHP is used for the weighting process and determining the hierarchy of route selection by prioritizing routes that meet the criteria and the appropriate weights. The optimization resulted in a 7,08% reduction in the distance and significantly reduce the makespan as well as the metaheuristic approach. Experimental processes and performance analysis are carried out to find that this method can consistently produce better and optimal solutions.

Keywords: Vehicle Routing Problem with Drone; Analytical Hierarchy Process; Tabu Search; Mapping