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Judul Jurnal Ilmiah (Artikel) : Cooling effect potential from liquefied petroleum gas flow in the fuel line of vehicle

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- c. Vol, No., Bln Thn : 14, 4, December 2017
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Artikel ini berisi tentang simulasi pemanfaatan ekspansi LPG untuk AC sebuah mobil. Hasil ditampilkan dalam bentuk skema skema, dimana ada beberapa data kuantitatif yang ditampilkan namun kurang jelas bagaimana mendapatkannya. Pembahasan yang dilakukan cukup baik, dengan disertai oleh referensi yang memadai sebanyak 17 dari 42 referensi yang digunakan (21,4%). Hasil dari penelitian ini sangat bermanfaat untuk menghemat energi yang dibutuhkan AC mobil dan menyumbang pengembangan sistem AC mobil.

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NIP. 197102071995121001
Unit Kerja : Fakultas Teknik Universitas
Diponegoro
Bidang Ilmu : Teknik Kimia

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Surakarta, 28 Februari 2020

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Cooling effect potential from liquefied petroleum gas flow in the fuel line of vehicle (Article) [Open Access](#)

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Abstract

This paper presents a simulation of the potential cooling effect that can be harvested from the Liquefied Petroleum Gas (LPG) phase change process on the fuel line before being supplied to the combustion chamber. The composition of LPG used was obtained from the average test result of the samples taken periodically in the fuel line with a special gas syringe which were then injected into Gas Chromatography-Mass Spectrometry (GCMS). Effect of fluctuations of LPG composition was also analysed on the energy delivery to the combustion chamber. Furthermore, simulation results showed that the potential cooling that may be harvested from the LPG fuel system on a 2000 cm³ engine was 1.4 kW in the eco-driving mode to be used as a cabin cooler. For a small passenger car that has a cooling load of 3.5 kW, this means the cooling effect from the fuel system is capable of contributing 40% to the cooling load. In conclusion, this potential is very promising and can be applied to countries that not do have the winter experience. © Universiti Malaysia Pahang Publishing.

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Experiments on the wear characteristics of A356 MMNCs fabricated using ultrasonic cavitation

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ABSTRACT

The wear properties of nanocomposites are evaluated in the present work. Owing to its good castability, A356 has been chosen as matrix material. Since Nano silicon carbide (SiC) and A356 are close in terms of density, SiC has been selected as reinforcement material. The dispersion of nano sized reinforcements in the metal matrix composite is challenging due to their higher surface to volume ratio of particles which results in agglomeration and clustering. Hence, the author had proposed an ultrasonic probe-assisted stir-casting method in this work for a uniform distribution of particles in the melt. Due to the nano sized reinforcements, interaction at the phase interface becomes enhanced due to the increased surface area which leads to improved material properties, even at a low weight fraction of the reinforcement. So, Nano SiC particles of size 50nm (from 0.1 to 0.5 by wt %) were added. Through SEM microstructures, it has been observed that reinforcements were well-dispersed in the aluminium matrix. Test specimens were prepared and tested as per ASTM standard. The experiments were conducted using a pin on the disc wear tester at different loads (30N & 40N) and at constant speed. With the addition of 0.5 wt % of nanoparticles, the wear resistance of the nanocomposites improved by 53.735% and 47.04% at 30N and 40N respectively compared to pure aluminium alloy.

Keywords: Ultrasonic cavitation; SiC; Nanocomposites; wear.

INTRODUCTION

Nowadays, researchers are focusing more on Nano-composites due to their good properties. These matrices when reinforced with particles, fibres or whiskers (like SiC, Al₂O₃) assume a dimension of less than 100nm (10⁻⁹ m), also called as Metal Matrix Nano-Composites (MMNCs). These MMNCs are promising materials to be used in many fields like automotive, aerospace etc. Due to the small (nano) sized reinforcements, interaction at the phase interface becomes enhanced due to the increased surface area which leads to enhanced materials properties, even at a low volume fraction of the reinforcement. The fundamental issue related to the fabrication of MMNCs is the lack of manufacturing methods that can be used to produce MMNCs in mass amount with a uniform dispersion of nanoparticles. The uniform dispersion of nano particles is imperative to improve the properties of the composite materials. Thus, the author

New design concept of a tank made of plastic material for firefighting vehicle

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ABSTRACT

Optimisation work has been increasingly directed at commercial vehicles to reduce their weight and thus enhance their performance. This optimisation, which responds to the requirements of various European standards with regard to the reduction of fuel consumption, also involves the elements mounted on these vehicles. This work discusses the development and design of a firefighting vehicle tank made from plastic material instead of the usual structure or stainless steel, essentially to reduce the weight of the structure. The design and construction feasibility of the components have been developed based on the specifications required. These specifications concern the tank capacity to resist at different load conditions and avoid any external vibrations. To ensure this, the tank consists of a number of internal welded plates in order to reduce the sloshing effect and secondly makes it modular and thus highly adaptable to the customer's needs. Specific method on the production of the component is also provided. Therefore, numerical tests were conducted with linear elastic stress analysis with square brick elements. The boundary conditions applied to the numerical model provide a complete support to the panels and are determined by the load condition of fluid used. This preliminary analysis was conducted to define the thickness of the tank panels and revealed that the use of a plastic tank leads to a weight reduction of about 35% and generates cost savings of about 25-30% compared to the steel equivalent. Therefore, the use of plastic materials compared to the classic materials seems to be very positive and this is critical information to support the final decision in a regulated sector, where the firefighting vehicles are.

Keywords: Plastic material structure designs; tank, vessel; commercial vehicle; Finite Element Analysis analysis; mechanical structure.

INTRODUCTION

Firefighting vehicles are a special and regulated category of vehicles that must meet specific performances. They are multiple use vehicles called, for example, to operate at airports or fight forest fires. In general, they are required to have a tank to contain the firefighting liquid, which may be water or a foaming agent capable of preventing oxygen from reaching the flames and thus “smothering” the fire [1, 2]. In addition, there is also a much smaller tank, which can contain an additive to be used in association with the liquid in the main tank. The tank must also be fitted with a suitable plumbing system, both for liquid intake and delivery to the fire hoses or the “cannon” generally installed on the vehicle's roof and controlled from inside the cab [3, 4]. Additional to these fundamental

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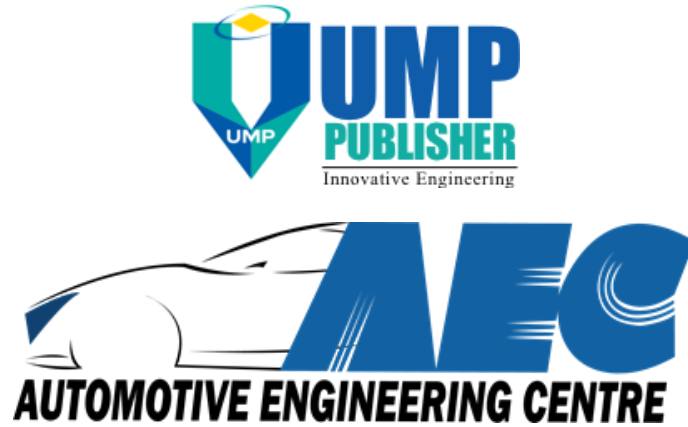
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