Preface

Greeting,
Vol. 2 No. 3 of the Automotive Experiences published 5 articles. The executive summary of the 5 articles is presented as follows.

The first article discusses the Electronic Tracking Control System (ETCS) for fuel cargo vehicles and chemical cargo vehicles. If the vehicle speed is more than 60 km/hour, ETCS will send an SMS to the vehicle owner about the speed and location of the vehicle being monitored. With ETCS, vehicle accidents and misuse can be minimized by fast monitoring and communication between the owner and the driver.

The second article reports a study of transesterification of used cooking oil for biodiesel. Used cooking oil has the potential as biodiesel so that it can reduce environmental pollution. Transesterification of triglycerides in used cooking oil with an alcohol to form methyl esters of fatty acids or biodiesel and glycerol. The type of catalyst is one of the determinants of the transesterification reaction and coal fly ash has the potential to be used as a catalyst in the production of biodiesel. Therefore, this study aims to examine the effect of the oil-methanol ratio and the time of the transesterification of used cooking oil to the yield of biodiesel produced using an alkali-activated fly ash catalyst. Transesterification is carried out at 60 °C, the stirring speed...
speed is 700 rpm, and the amount of catalyst load is 4%. The result, the highest yield of biodiesel reached almost 89%. This biodiesel consists of 48.86% methyl oleate and 33.86% methyl palmitate and has a density that meets the Indonesian National Standard, which is 0.85 - 0.90 g/cm$^3$. Finally, the BET test on the fly ash catalyst shows a catalyst surface area of around 104.106 m$^2$/g.

The third article discusses the development of lightweight automotive materials for increasing fuel efficiency and reducing carbon emissions. Material reliability is assessed by how much weight reduction can be achieved, production costs, safety and durability. Ferro materials (mild steel, High Strength Steel, and Advanced High Strength Steel), non-ferrous (aluminium and magnesium alloy), and Fiber Reinforced Plastics (FRP) have been proven to reduce the total weight of vehicles up to 12.6%. Confirmation of statistical data from the literature illustrates the possibility of using lightweight material to achieve zero CO$_2$ emission. In addition, the 12.6% weight reduction still meets the vehicle safety factor.

The fourth article presents the engine performance using diesel oil and biodiesel obtained from the reaction of vegetable oils with alcohol through the process of alcoholysis. Tests carried out on variations of diesel oil 100% (B0), 10% biodiesel (B10), 20% biodiesel (B20) and 30% biodiesel (B30). Engine performance testing is carried out at 1500 rpm to 4000 rpm and the amount of katalis 4%. Rendemen biodiesel tertinggi mencapai hampir 89%. Biodiesel ini terdiri dari metil oleat 48,86% dan metil palmitat 33,86% dan memiliki densitas yang telah memenuhi SNI yaitu pada range 0,85-0,90 g/cm$^3$. Uji BET terhadap katalis abu layang menunjukkan luas permukaan katalis sekitar 104,106 m$^2$/g.

Artikel ketiga membahas perkembangan material otomotif bobot ringan untuk peningkatan efisiensi bahan bakar dan pengurangan emisi karbon. Keandalan material dinilai dari seberapa besar pengurangan berat yang dapat dicapai, biaya produksi, tingkat keselamatan dan ketahanan. Material ferro (mild steel, High Strength Steel, dan Advanced High Strength Steel), non-ferro (paduan aluminium dan magnesium), dan Fiber Reinforce Plastics (FRP) terbukti dapat mengurangi berat total kendaraan hingga 12,6%. Konfirmasi pada data statistik dari literatur, memberi gambaran kemungkinan penggunaan material bobot ringan dapat mencapai zero CO$_2$ emission. Selain itu, pengurangan berat 12,6% masih memenuhi faktor keamanan kendaraan.

Artikel keempat mempresentasikan performa mesin menggunakan minyak diesel dan biodiesel yang diperoleh dari reaksi minyak nabati dengan alkohol melalui proses alkoholisis. Pengujian dilakukan variasi minyak diesel 100% (B0), biodiesel 10% (B10), biodiesel 20% (B20) dan biodiesel 30% (B30). Pengujian performa mesin dilakukan pada putaran mesin 1500
rpm at intervals of 500 rpm. The highest torque is obtained at 2000 rpm using B0, B10 and B20 of 310.3 Nm, 306 Nm and 308.1 Nm, respectively. The highest power is obtained at 3000 rpm using B0, B10 and B20 of 114.7 hp, 115.1 hp and 114.9 hp, respectively. The average fuel consumption with B0, B10 and B20 is 1.42 ml/s, 1.54 m/s, and 1.74 ml/s, respectively. B30 fuel cannot be tested on a vehicle due to detonation so that combustion does not occur completely and B30 fuel properties are incompatible with the vehicle being tested.

The last article discusses about cassava biogasoline that tested on electronic fuel injection vehicles in urban traffic conditions with varying engine load. Biogasoline tested includes B0, B10, B20, and B30. The engine speed was operated within 750 to 1800 rpm (low-speed range) to simulate urban traffic condition. The engine load was varied through the operation of air conditioner (AC). Fuel consumption was measured in real terms (ml/s) and CO emissions were measured with the Hesbon HG 520 Engine Gas Analyzer (EGA) in the percentage of total exhaust gas. The results showed that B10 has the lowest fuel consumption of 0.24 ml/s in conditions without AC and 0.41 ml/s with AC. Meanwhile, CO emissions tend to be constant with change in the proportion of cassava biogasoline and increased with additional AC load.

rpm sampai 4000 rpm dengan interval 500 rpm. Torsi tertinggi diperoleh pada putaran 2000 rpm menggunakan bahan bakar B0, B10,dan B20 masing-masing sebesar 310,3 Nm, 306 Nm, dan 308,1 Nm. Daya tertinggi diperoleh pada putaran 3000 rpm pada B0, B10 dan B20, masing-masing sebesar 114,7 hp, 115,1 hp dan 114,9 hp. Rata-rata konsumsi bahan bakar dengan B0, B10, dan B20, masing-masing sebesar 1,42 ml/s, 1,54 m/s, dan 1,74 ml/s. Bahan bakar B30 tidak dapat diuji pada kendaraan dikarenakan terjadi detonasi sehingga pembakaran tidak terjadi secara sempurna dan propertis bahan bakar B30 yang tidak sesuai dengan kendaraan yang diuji.

Artikel terakhir membahas tentang biogasoline dari singkong yang diujikan pada kendaraan electronic fuel injection pada kondisi lalu lintas perkotaan dan variasi pembebanan mesin. Biogasoline yang diujikan meliputi B0, B10, B20, dan B30. Kondisi lalu lintas perkotaan menjadikan putaran mesin terkontrol pada kisaran putaran rendah, ± 750 s.d 1800 rpm dengan air conditioner (AC) sebagai variasi beban mesin. Konsumsi bahan bakar diukur secara riil (ml/s) dan emisi CO diukur dengan Engine Gas Analizer (EGA) Hesbon HG 520 secara persentase dari total emisi gas buang. Hasil penelitian menunjukkan B10 menghasilkan konsumsi bahan bakar terendah yaitu 0.24 ml/s pada kondisi tanpa AC dan 0.41 ml/s dengan AC. Sementara itu, Emisi CO cenderung konstan dengan perubahan proporsi biogasoline singkong dan meningkat dengan tambahan beban AC.
We hope Vol. 2 No. 3 Automotive Experiences presents several new insights in the automotive field, and is an inspiration to conduct further research. We are happy to accommodate and respond to any comments and questions you might have about the direction and contents of the Automotive Experiences.

Kami berharap Vol. 2 No. 3 Automotive Experiences ini menyampaikan beberapa wawasan baru di bidang otomotif, dan menjadi inspirasi untuk melakukan penelitian-penelitian selanjutnya. Kami senang untuk mengakomodasi dan menanggapi setiap komentar dan pertanyaan yang mungkin Anda miliki tentang arah dan isi jurnal Automotive Experiences.

Magelang, November 2019

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