UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ANALYSIS OF EFFICIENCY ON DIFFERENT TYPES OF FUEL FOR PERODUA CAR

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Mechanical Engineering Technology (Automotive) with Honours.

by

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automotive) with Honours. The member of the supervisory is as follow:

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ABSTRAK

RON 95, RON 97 dan RON 100 memberikan kesan yang berbeza kepada enjin. Di samping menyediakan perlindungan enjin yang berbeza, ketiga tiga jenis petrol ini juga memberi kesan yang berbeza terhadap prestasi dari segi penggunaan minyak. Orang ramai berpendapat mereka dinafikan dari menggunakan bahan api yang lebih baik iaitu RON 97 dan RON 100 kerana lebih mahal berbanding RON 95. Percubaan ini bertujuan untuk mengetahui sejauh mana perbezaan antara ketiga jenis RON dengan enjin dalam penggunaan minyak. Di samping itu, eksperimen ini juga akan menganalisis penggunaan minyak dari bahan api yang berlainan jenis pada Myvi dengan menggunakan kaedah ANOVA oleh perisian SPSS. Hasil eksperimen ini juga akan memuaskan hati dan menambah pengetahuan tentang kesan jenis RON yang berbeza kepada orang ramai. Dalam kajian ini, ia juga menekankan penggunaan kenderaan yang lebih khusus, hanya jenis kenderaan PERODUA, Myvi. Selain itu, percubaan ini juga akan cuba memastikan semua aspek yang mempengaruhi penggunaan bahan api dipertimbangkan.

ABSTRACT

RON 95, RON 97 and RON 100 gives different effects to the engine. Besides the types of gasoline provides different protection to the engine, these types of RON also gives different impact on performance in terms of the fuel consumptions. People argued they were denied from using a better fuel which are RON 97 and RON 100 because both of these RON are expensive than RON 95. This project aims to learn how much the difference between these three RON types to the engine in terms of fuel usage. In addition, this study will analyze the fuel usage of different types of fuel on Myvi by using ANOVA method by SPSS software. The result of this experiment will also satisfy and add knowledge about the effect of different types of RON to the public. In this study, it also emphasizes the use of more specific vehicles, only the PERODUA type of vehicle, Myvi. Furthermore, this experiment will try to ensure that all aspects affecting fuel consumption are taken into consideration.

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INTRODUCTION

1.1 Introduction

This chapter begins with an introduction to the fuel in vehicles in automotive industry. The category and types of fuel also will be described. Besides that, this chapter also will provide the problem statements, the objective of the study and a scope for this project. Plus, all things that affected the performance and fuel consumption of the vehicles will be explained with detail. The entire project will be focussing about types of fuel such as RON 95, 97 and 100 effect on performance of the PERODUA car specificly for the fuel-efficient.

1.2 Background of Study

In an era of increasingly modernized globalization, all information is only at the fingertips. No exception is also in the field of automotive technology. Vehicles in the automotive field are well equipped with a variety of systems. To drive the vehicle, we need fuel. Fuel is an important things because not all types of

fuel is compatible to the specific engine. Some types of fuel can damaged the engine if it is not suitable for the engine. There were many types of fuel are used in this industry. Among the fuel used today is ethanol, methanol, gasoline, diesel, biodiesel, natural gas and hydrogen. These types of fuel will be evaluate in details in the next chapter.

In Malaysia, most of people used diesel and gasoline. There is three(3) types of gasoline that are sold in Malaysia such as RON 95, RON 97 and RON100. The price of fuel are regulated by government. The price have been gradually increased since 2009. By 2014, RON 97 per litre price is 38% more than RON 95. This has resulted in dissatisfaction among many vehicles user in Malaysia. People argued because they were denied from using RON 97 that is better fuel than RON 95. In order to evaluate the real effect of both types of fuel, there is a need to investigate engine response to these two gasoline grades. Plus, RON 100 is included in the same investigation. There were several of investigation and studies about performance for the both types of fuel such as an investigation by using Mitsubishi car in a constant speed. Other than that, the experiment by using Proton Saga 1.3 CVT also was conducted by different groups of people. There was also conducting an experiment by using a different types of engine car such as Volkswagen Polo Sedan and Volkswagen Jetta TSI and much more experiment. These experiments was conducted by using not just a different vehicles but also in a different method.

All experiments that have been implemented emphasize many aspects to get the right result. Among the important aspects to be aware of are engine types, speed levels, driving behaviors, road surfaces and types of gasoline. Besides

that, weather, traffic and aerodynamic of a car also affects the fuel consumption of the vehicles. So all these aspects are very important to carry out experiments and studies on vehicle fuel consumption. All of these elements will be explained further in the next chapter.

This study will cover all about fuel consumption of a car, types of RON use in the experiment and analysis of the project data.

1.3 Problem Statement

The price of fuel is quite high and expensive in Malaysia. People argued they were denied from using a better fuel (RON 97 and RON 100) expensive than RON 95. In order to know whether there is really have a greater performance difference between these three types of fuel or not, some studies on the ability or impact of RON 95, RON 97 and RON 100 on vehicles have been conducted. The study conducted by different individuals and they finally came to a different conclusion. Among the studies that have been done are using the Volkswagen, Proton and Mitsubishi vehicles. The way of the conducted experiment are also different. Some are researching with static engines (dyno) and others are conducting research by driving the vehicle. So far, no data from PERODUA vehicle is conducting the studies on the effects of Ron 95, 97 and 100. Proton vehicles that are being studied are Proton Saga 1.3L CVT.

1.4   Rational of Study

This experiment will be performed to identify the difference on performance of RON 95 , RON 97 and RON 100 for PERODUA car such as Myvi. Myvi was selected in this experiment is because in other experiments, there is no other person or party who uses PERODUA vehicles for comparing the performance of these three types of RON. PERODUA is the largest car manufacturers and closely followed by Proton in Malaysia. Thus, the experiments to be carried on the car from PERODUA will be an important topic among the people in Malaysia. Additionally, people who use the vehicle from PERODUA are able to know and understand more about their vehicles and will indirectly increase knowledge about the comparison of the gasoline used.

The area of study will be conducted in Malacca. Malacca was selected because near and this state has a fairly crowded traffic. The area around town in Malacca was chosen due to the relatively crowded condition traffic congestion. In addition, the road to Durian Tunggal mostly is highway which is AMJ highway. It is ideal for comparing roads in the crowded and highway. For weather conditions, studies will be conducted during normal weather.

1.5   Objective

a)   To study the different types of fuel such as RON 95, RON 97 and RON 100 on the performance of PERODUA car which is Myvi 1.3 SE Automatic Transmission specificly on the minimum fuel usage.

b)   To analyze the effect of different types of fuel such as RON 95, RON 97 and RON 100 on the performance of Myvi 1.3 by using ANOVA method by SPSS software.

c)   To determine the best type of fuel that gives the best performance and fuel-efficient for Myvi 1.3.

1.6   Scope of Research

a)   This study is conducting on PERODUA car such which is Myvi 1.3 SE Automatic Transmission.

b)   This study will be using a PETRON gasoline.

c)   The analysis will be using ANOVA method by SPSS software.

d)   Data that will be taken is distance travel, gasoline consumption, different types of road condition and types of RON.

1.7   Significance of The Study

The results of this study are important to:

a)   Learn about the difference on performance of RON 95 RON 97 and RON 100 specificly on the minimum fuel usage by using a car from PERODUA.

b) Add documentation about the previous studies.

c) To increase knowledge on the relationship between road type, driving speed, driver behaviour, vehicle engine and other with the type of gasoline used.

d) To help in purchasing fuel that save cost for consumer.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

This chapter will be discussed about certain published information from past researcher regarding to the performance of the types of fuel such as RON 95, RON 97 and RON 100 and its effect on a fuel consumption by PERODUA car. The history of the RON also will be explain in this chapter. Besides that, the basic function of engine also will be discussed in this part. It also will cover with a things that affect performance of a car, the method that past researcher was using to conduct the experiment and some basic theories with a principle for a better understanding about this project.

2.2   Research On Types of Fuel

A car requires an engine to move. Then, the engine requires fuel to produce power to move the car. There are many types of fuel used in road transport vehicles such as ethanol, methanol, gasoline, diesel, natural gas, hydrogen and biodiesel.

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2.2.1   Ethanol

Ethanol is also known as the name of ethyl alcohol or grain alcohol. This type of fuel is flammable and colorless liquid. It is made by the fermentation of sugars in certain plants. In 2014, majority of ethanol produced 14 billion gallons is made from corn. That was in the United States. In Brazil, sugarcane is the abundant, renewable feedstock of choice. Most of the gasoline they buy every day already contains ethanol up to 10 percent. Octane can be increase by adding ethanol to gasoline , which boosts engine power and performance. E85 is referring to an ethanol fuel blend of 85% denatured ethanol fuel and 15% gasoline or other hydrocarbon by volume . Ethanol can be made from a plants such as switchgrass, corn stalks and leaves (called corn stover) and some varieties of cactus. Cellulosic ethanol is the ethanol derived from these sources. Ethanol can also be processed from abundant new supplies of natural gas. Ideally, the one that is widely available in a particular area and can be made into ethanol at the scale needed to meet consumer demand. At the pump, E85 as shown in the **Figure 2.0** often sells for 15 to 30 percent much cheaper than regular gasoline. For each mile, the engine efficiency gains from E85 cost less even this type of fuel does have less energy content than gasoline.

Figure 2.0 : Ethanol（E85）

(Sources : < http://farmweeknow.com/story-ethanol-production-looks-strong-2017-0-154155 >)

2.2.2 Methanol

Methyl alcohol is known as methanol or wood alcohol. This one is also flammable and colorless liquid which is the simplest alcohol. Compare to ethanol, the process for converting raw materials to methanol is quite simple, making the potential cost savings to the consumer very attractive. Any other things that once was biomass can be converted to methanol for use as a fuel. Methanol use coal, natural gas and farm waste as its raw material. Even trash in landfills emits methane gas over time, which can be converted to methanol by capturing it. Plus, methanol is toxic and it is not for humans to drink. Besides that, it is used in making antifreeze, window cleaner and solvent. It's the main component in windshield wiper fluid, which we dump directly to the atmosphere. Since methanol has higher octane and a lower flashpoint than traditional gasoline, racecar drivers were using it for decades and it is also safe in an event of crash. Various tests have shown that methanol could be used safely in vehicles that also run on E85. But, material compatibility is an important thing that need to be concern.. It is because by using water in the fuel can cause corrosion of

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parts if the wrong material is used, such as zinc or aluminium. The example of methanol and enthanol fuel station has shown in **Figure 2.1.**

Figure 2.1 : Methanol and Ethanol fuel station.

(Sources : <http://www.thecuttingedgenews.com/index.php?article=74973 >)

2.2.3 Gasoline

From 42 gallon barrel of crude oil, only 19 gallon ends up as gasoline. The crude oil then is shipped to an oil refinery after it is being extracted from the ground. From there, it is heated in pressurized chamber to temperature above 350°C and then distilled into gasoline. Next, to boost this gasoline low octane rating, it needs to be blended with additives in order to achieve increased efficiency and avoid harming engines with pre-ignition or knocking. It is because when knocking occur, it can cause severe engine damage. In the United States from 1920s through the mid 1990s, plumbum was used as an additive but it has been banned for causing brain damage. So, most of the gasoline there currently sold was blended with aromatics, ethanol, or some combination of the two to boost its octane rating. Due to their toxic and carcinogenic nature, the use of aromatics is still controversial. Two types of gasoline fuel station as shown in **Figure 2.2.**

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