



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**ANALYSIS OF EFFICIENCY OF DIFFERENT TYPES OF FUEL  
FOR PROTON 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

**MUHAMMAD AMIRUN MUKMIN BIN RODZI**

**B071510519**

**961104075983**

FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING  
TECHNOLOGY

2018

**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

Tajuk: ANALYSIS OF EFFICIENCY OF DIFFERENT TYPES OF FUEL FOR PROTON CAR

Sesi Pengajian: 2018

Saya **MUHAMMAD AMIRUN MUKMIN BIN RODZI** mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. \*\*Sila tandakan (X)

<input checked="" type="checkbox"/>	SULIT*	Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972.
-------------------------------------	--------	--

<input type="checkbox"/>	TERHAD*	Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan.
<input checked="" type="checkbox"/>	TIDAK TERHAD	
Yang benar,		Disahkan oleh penyelia:
.....		.....
MUHAMMAD AMIRUN MUKMIN BIN RODZI		EZZATUL FARHAIN BINTI AZMI
1115 G-12 JALAN PERMATANG DAMAR LAUT BAYAN LEPAS, PULAU PINANG		Cop Rasmi Penyelia
.		
Tarikh:		Tarikh:

\*Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

## **DECLARATION**

I hereby, declared this report entitled “**ANALYSIS OF EFFICIENCY OF DIFFERENT TYPES OF FUEL FOR PROTON CAR**” is the results of my own research except as cited in references.

Signature :

Author's Name : MUHAMMAD AMIRUN MUKMIN BIN RODZI

Date : 30/11/2018

## **APPROVAL**

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology Mechanical (Automotive) with Honours. The member of the supervisory is as follow:

.....

(Ezzatul Farhain Binti Azmi)

## ABSTRAK

Laporan projek ini memberikan pandangan keseluruhan kaedah untuk mendapatkan maklumat bagi penggunaan minyak pada kereta Proton Saga FLX 1.3 bagi melihat minyak mana yang lebih efektif terhadap kereta ini. Proton Saga FLX 1.3 digunakan kerana kereta ini adalah kereta yang sering digunakan oleh rakyat Malaysia. Ini berdasarkan harganya yang murah dan mempunyai ergonomic yang sesuai untuk rakyat Malaysia.

Kajian ini menjalankan ujian terhadap tiga jalan yang berbeza. Ini bagi mengenal pasti sama ada geseran pada setiap jalan atau daya tambahan ketika menaiki bukit menyumbang kepada penggunaan minyak. Selain itu, kajian ini juga diulang sebanyak tiga kali bagi mendapatkan data yang lebih tepat. Jalan yang digunakan ialah lebuh raya, jalan domestik dan jalan berbukit.

Minyak yang digunakan dalam kajian ini adalah minyak RON 95 dan RON 97. Ini kerana minyak ini adalah minyak yang sesuai untuk kereta Proton Saga. Selain itu juga minyak ini adalah minyak yang sering dijumpai di stesen-stesen minyak di Malaysia. Jadi projek ini dapat membantu orang ramai dalam memilih minyak yang terbaik pada kereta Proton Saga mereka.

Bagi jenis jalan pertama dan kedua iaitu lebuh raya dan domestik, nilai min bagi RON 95 adalah lebih rendah daripada RON 97 masing-masing. Ia menunjukkan bahawa RON 95 adalah lebih jimat daripada RON 97 dalam kedua-dua jenis jalan ini untuk Proton Saga FLX 1.3. Untuk jenis jalan seterusnya, menaik dan menurun bukit, hasilnya sedikit berbeza, kerana RON 97 menggunakan minyak kurang daripada RON 95.

## ABSTRACT

This project presents the overall view method in obtaining information on the use of fuels for the Proton Saga FLX 1.3 car to see which fuels is more effective on the Proton Saga FLX 1.3 car. Proton Saga FLX 1.3 is used because the car is a car that is often used by Malaysians. This is based on its low price and has an ergonomic that is fit for Malaysians.

This study conducted tests on three different roads. This is to identify whether friction on each road or additional force when mounting a hill contributes to the use of fuels. In addition, this study was repeated three times for more accurate data. The roads used are highways, domestic and hilly roads.

The fuels used in this study is RON 95 and RON 97 fuels. This is because the fuels are the ideal fuel for Proton Saga cars. In addition, this fuel is often found in petrol stations in Malaysia. Therefore, this project can help people in choosing the best fuel on their Proton Saga car.

For the first and second types of road which are highway and domestic, the mean value for RON 95 is lower than RON 97 respectively. It shows that RON 95 is saver than RON 97 in these types of road for Proton Saga FLX 1.3. For the next type of road, uphill and downhill, the results is slightly different, because RON 97 used less fuels than RON 95.

## **DEDICATIONS**

This report is dedicated to my beloved parent for their endless love support and encouragement.

Rodzi Bin Abu Bakar

&

Norhan Binti Abdullah



## ACKNOWLEDGEMENT

I would like to thank and express my appreciation for my beloved parents and family for their support and love through my life. Thank you for giving me inspiration and motivation to reach my dream from the beginning. I would like to sincerely thank to my supervisor Mrs.Ezzatul Farhain Binti Azmi for giving me a guide and support throughout this study and especially her confident in me. I believe I learned from the best.

To all my friend, thank you for your understanding and morale support in my unlimited moment of crisis. Your friendship make my life have something to memorable. I cannot list all the name here, but all of you are always there through up and down while writing this report. I would like to thank to all for giving me a support, idea and helps me to complete this report successfully. Thank you.

# TABLE OF CONTENT

<b>DECLARATION</b>	iii
<b>APPROVAL</b>	iv
<b>ABSTRAK</b>	v
<b>ABSTRACT</b>	vi
<b>DEDICATION</b>	vii
<b>ACKNOWLEDGEMENT</b>	viii
<b>TABLE OF CONTENT</b>	ix
<b>LIST OF TABLES</b>	xii
<b>LIST OF FIGURES</b>	xiii
<b>LIST OF ABBREVIATION, SYMBOL AND NOMENCLATURE</b>	xiv
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 Introduction	1
1.2 Background problem	1
1.3 Rational of study	3
1.4 Problem of statement	3
1.5 Objective of the study	4
1.6 Scope of the study	4
1.7 Significance of study	4
1.8 Thesis outline	5

## **CHAPTER 2: LITERATURE REVIEW**

2.0	Introduction	6
2.1	History of car	6
2.2	Proton car	10
2.2.1	Chosen car	11
2.3	Type of fuels	13
2.3.1	RON 95	16
2.3.2	RON 97	16
2.4	Efficiency	17
2.4.1	Fuel efficiency	18
2.5	Type of road	19
2.6	Analysis	21
2.6.1	Ancient conception of analysis	22
2.6.2	Analysis software SPSS	22

## **CHAPTER 3: METHODOLOGY**

3.0	Introduction	24
3.1	Study of fuel	25
3.2	Design of experiment	25
3.3	Data taken	26
3.4	Data analysis using SPSS	26
3.4.1	ANNOVA	26
3.5	Flowchart	27

## **CHAPTER 4: RESULT AND DISCUSSION**

4.0	Introduction	28
4.1	Experimental results	28
4.2	Constant factor	30
4.3	Analysis results	31

## **CHAPTER 5: CONCLUSION AND RECOMMENDATION**

5.0	Introduction	39
5.1	Challenge faces	39
5.2	Achievement of research objectives	39
5.3	Conclusion	41
5.4	Recommendation	41

<b>REFERENCES</b>	<b>43</b>
-------------------	-----------

## LIST OF TABLES

<b>Table</b>	<b>Title</b>	<b>Pages</b>
4.1	Data for litre used	28
4.2	Mean value	29

## LIST OF FIGURES

<b>Figure</b>	<b>Title</b>	<b>Pages</b>
2.1	Benz patent Motorwagen	7
2.2	Cugnot's 1771 fardier à vapeur	7
2.3	world first internal combustion engine creator	8
2.4	first gasoline powered combustion engine	8
2.5	Evolution of Proton car	12
2.6	Ron 95	16
2.7	Ron 97	17
2.8	Hilly road	20
2.9	Highway road	20
2.10	Domestic road	20
3.1	Proton Saga	25
4.1	Variable view data set	30
4.2	Data view data set	31
4.3	Step univariate	31
4.4	Univariate box	32
4.5	Model box	32
4.6	Option box	33
4.7	Univariate Analysis of Variance	34

4.8	Levene's Test of Equality	34
4.9	Test of Between Subjects Effects	35
4.10	Litre used for RON 95 and RON 97 fuels VS types of roads	36

## **LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE**

ANOVA	-	Analysis of variance
SPSS	-	Statistical Package for the Social Science
RON	-	Research octane number
US Dollar	-	United State Dollar
KM	-	Kilometer
RM	-	Ringgit Malaysia



# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Introduction**

This research is to study about the relationship between type of fuels RON 95 and RON 97 and type of road affect the distance travelled by the Proton car. A logical consequence for this study is to determine which fuel have better performance under a different road at the certain speed.

### **1.2 Background of Problem**

This research is to analyze the effect of different types of fuel such as RON95 and RON97 on the performance of proton car at different type of road. RON is stand for research octane number. The 97 or 95 is stand for the compound of the fuels. The performance is specific on the litre used for each fuel. The research will use a constant Proton car, but different type of fuel and type of road. Next, to determine the better performance fuel in the certain condition.

Nowadays, in our country the petrol price is not stable and usually changed in our country. For example, every Thursday at 12.00 P.M the petrol price have been reset to a new price every week. There are three main fuels that have been changed

weekly in Malaysia with are RON 95, RON 97 and diesel. The unstable fuels price is due to US Dollar per tong that have been use in exchange of fuel. As the Ringgit value is decreasing, so the price for the fuels is increasing for our country. So, when the Ringgit is dropping the price for a fuels is increasing.

There are many types of fuel can be found among them premium unleaded petrol, super unleaded petrol, bio fuel, LPG auto-gas and diesel. In Malaysia, we usually heard about petrol and diesel only. This research will use petrol fuels RON 95 and RON 97 and determine the efficiency of the fuel. Diesel will not be used as Proton car use petrol as their fuel.

For the car, Proton car have been chosen because of it price and the common car in Malaysia. Proton is among the cheapest car in Malaysia so it is commonly used car. Also Proton meet the ergonomic of Malaysia user, as it was Malaysia brand. Different car have different efficiency of fuels, Proton Saga have been chosen because it is the first model of Proton car which also the first Malaysian car.

There are several road that will be used in this research that is identified suitable for my project. Highway, domestic and uphill/downhill road. The parameter that we can check is the friction of the road and the load that exerted on the car.

The software that will be used for the analysis is SPSS software. "SPSS stand for Statistical Package for the Social Science. In this software this research will run ANOVA. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, descriptive statistics and complex statistical analysis and plots of distributions and trends.

### **1.3 Rational of Study**

The rational of the study will discuss about why this research has been done. The rational of this study is to identify the better performance fuel between RON 95 and RON 97. This is because in Malaysia we often see this two types of fuel so it get some ideas to find which one is better. Then, to determine the efficiency of the fuel on the Proton Saga car. The efficiency for the car is different for every model, so, this research will focus on Proton Saga as the first of our country model car. As the petrol price is not stable, it spark some ideas to make this research.

### **1.4 Problem Statement**

In today's world, fuels are needed more than ever because of the increasing of demand. Conventional fuels, as example coal, natural gas and fossil fuel are constantly being depleted. However, the world's dependency on these fuels is still growing year by year. In additional, the price of the fuel for RON 95 and RON 97 is not stable. Also with the decreasing value of Ringgit we have to purchase with higher price compare to US Dollars. Increasing up in gas costs has thus prompted the issue of fuel proficiency turning into an undeniable basic factor for fuel customers. The fuel stations additionally offer some fuel, for example, RON 95 and RON 97. The shoppers at that point, are given another difficulty which is the best added substance, in the meantime the one generally conservative? Despite the fact that RON 95 is less expensive, the oil makers guarantee that their RON 97 gives more Kilometers.

## **1.5 Objective of the study**

The objectives of this study are:

1. To study types of fuel and its relationship with types of road in our country Malaysia.
2. To analyze which type of fuel is more efficient for the Proton Saga based on the litre used for each fuel.
3. To determine whether the type of road affects the fuel efficiency.

## **1.6 Scope of the Study**

The scope of this study discusses about the limitation of this study. The fuels that will be used are RON 95 and RON 97. Then, Proton Saga will be used as the car. Next, types of road that will be tested are only on 3 different types of road. For the volume of the fuels, this research will run with full tank fuel for each fuel and then drive for 20KM. After that, the fuel is refilled and the amount of fuel refilled is the litre used for the car.

## **1.7 Significance of the Study**

The significance of the study is about the importance of this study to other people. The significance of this study is to help people to know which fuel has better performance for the car. This might save the cost of purchasing fuel. Then, this study also can help people to identify whether the types of road have an effect on the fuel performance for the Proton Saga car. Next, to give awareness to other people about the effectiveness of fuels in different types of roads for Proton Saga car.

## **1.8 Thesis outline**

In the chapter 1, this research will focus on the important of the study. Also, to give ideas on what and why the research is all about. Then, the objectives of this research and the benefit to other people. Next, also discussing about scope of this study and the rational of the study.

In the chapter 2, this research will make a review for the existing journal, books, articles or any other source of information. The information that have been taken is related to this research field. Also credit will be given to the author. This research will take their ideas and put it into the research.

In the chapter 3, this research will explain about how this research is done. Also the method that have been use to get the data.

In chapter 4, we will explain about our result and discussion on the efficiency of fuels.

In chapter 5, we will conclude all of this experiment. Also a future recommendation for a better result.

## **CHAPTER 2**

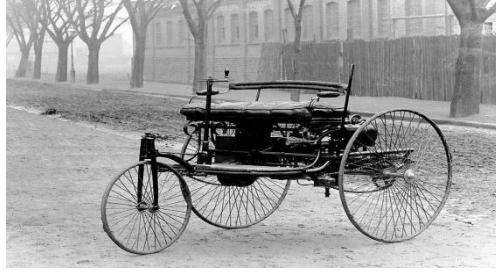
### **LITERATURE REVIEW**

#### **2.0 Introduction**

This research is aimed to compare RON 95 and RON 97 efficiency at the different road by using Proton car. In this chapter this research will include other research, journal or any related information to this chapter.

#### **2.1 History of Car**

Car is a transportation that used motor vehicle. Some other definition is it can accommodate 1-8 people and have four tires. Generally, car have automatic or manual transmission. In the 20<sup>th</sup> century the car become global need. In 1886, is recognized as modern car birth date when Karl Benz built his Benz Patent Motorwagen as shown in **Figure 2.1**. Cars then become widely available in the 20<sup>th</sup> century. One of the car that was available was model T in 1908 manufacturer by Ford Motor Company. Cars then become widely used in US as they replaced animal drawn carriage and cart. But the Western Europe and the other part of world still not accepted it.



**Figures 2.1:** Motorwagen

In the early year, there are no transportation can be used to go to one place to another. Thus, they developed something that can be used to move from one place to another without using human energy. From there they created a thing that called a car.

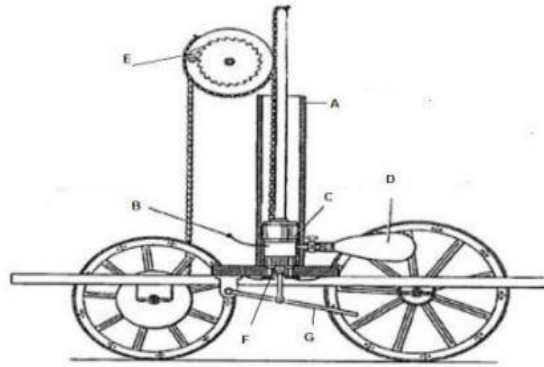
In 1672, the steam powered vehicle that have been built by Ferdinand Verbiest was unable to carry a passenger. Then in 1769, a steamed powered tricycle was built by Nicolas-Joseph Cugnot as shown in **Figure 2.2**. He also created two steam tractor for the army of French. His invention however water supply and maintaining steam pressure problem. Next in 1801, Richard Trevithick built the first demonstration of steam powered road vehicle and has been called as puffing devil. Yet this design also has weakness which is unable to maintain sufficient steam pressure for a longer time.



**Figure 2.2:** Steam powered tricycle

In years 1807, Nicéphore Niépce and his brother Claude possibly the world first internal combustion engine creator as shown in **Figure 2.3**. But they install it in the

boat at the France River. Then, first car that been designed by using internal combustion engine is in 1808 by François Isaac de Rivaz. He used the mixture of oxygen and hydrogen.



**Figure 2.3:** First internal combustion engine

Then, some improvement have been made in 1870 by Siegfried Marcus he built the first gasoline powered combustion engine as shown in **Figure 2.4**. The engine has been put in the pushcart. With four progressively sophisticated combustion-engine it has a lifespan about 10-15 years that affect later car, He also created two-cycle combustion engines. In 1880 he introduced four-cycle combustion engines.



**Figure 2.4:** Gasoline powered combustion engine