UNIVERSITI TEKNIKAL MALAYSIA MELAKA

THE STUDY OF EFFECT OF ENGINE PERFORMANCE USING DIFFERENT FUEL FOR PERODUA VIVA

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

by

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2016

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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TAJUK: **The Study Of Effect Of Engine Performance Using Different Fuel For Perodua Viva**

SESI PENGAJIAN: **2016/17 Semester 1**

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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 Engineering (Automotive Technology) with Honours. The member of the supervisory is as follow:

……

(Encik Ahmad Zainal Taufik Bin Zainal Ariffin)

Supervisor

ABSTRAK

Matlamat projek ini ialah untuk menganalisis, ujian ekspermentasi prestasi enjin dan kadar gas pencemaran dari kenderaan yang menggunakan jenis-jenis gred minyak RON dan jenama minyak yang berbeza. Analisis ini melibatkan penggunaan casis dinamometer untuk ujikaji minyak dan menggunakan penganalisis exhaust gas kenderaan untuk ujikaji tahap gas pencemaran. Untuk ujikaji prestasi enjin kenderaan enjin diuji menggunakan enjin dinamometer untuk mendapatkan data prestasi enjin. Hasil data tersebut dapat dilihat melalui graf prestasi iaitu termasuk kuasa, tork dan kuasa kuda. Seterusnya, bagi ujikaji kadar gas pencemaran pula data yang diambil setelah ujikaji akan dianalisis dan dinilai. Ujikaji kadar pencemaran akan dijalankan pada situasi kenderaan pada tahap setara dan juga ketika kenderaan menjalani ujian pada casis dinamometer disamping menggunakan jenis gred minyak RON dan jenama minyak yang berbeza. Projek ini juga untuk membangunkan langkah-langkah ujikaji yang standard untuk ujikaji prestasi enjin dan kadar gas pencemaran menggunakan casis dinamometer. Setelah sempurna projek ini, hasil kajian akan dapat dilihat apakah jenis gred RON minyak dan jenama minyak yang menghasilkan kuasa atau prestasi enjin yang tinggi juga menghasilkan kadar gas pencemaran yang paling rendah. Eksperimentasi ujikaji lanjutan boleh dijalankan untuk mendapatkan data dan hasil kajian yang lebih baik dan tepat seperti menggunakan chasis dinamometer.

ABSTRACT

The goal of this project is to analyze the performance of engine and emission level produced by engine by using different type of RON fuel grades and brands. This analysis involves chassis dynamometer for engine performance and using automobile exhaust gas analyzer for emission testing. For performance engine analysis, the engine first is tested by using chassis dynamometer with different type of RON fuel grades and brands. The result by running of chassis dynamometer will show the graph performance of engine include the power, torque and horsepower. Next, the emission test is also performed to analysis and compares the data of emission level produced by engine. This emission test will be conducted with engine on idle and rapid acceleration by using chassis dynamometer with different type of RON fuel grades and brands. This project also targeted on developing the standard of procedure of fuel and emission testing using chassis dynamometer. At the end of the project, the result shows which type of RON fuel grades and brands produced greater engine performance and less emission level. Further experimental testing can be done for better output result such as using chassis dynamometer which can obtain more accurate result for the fuel consumption.

DEDICATION

To my beloved parents and friend was supported, encouraged, challenged, and inspired to me. And especially to our beloved my supervisor Mr Ahmad Zainal Taufik bin Zainal Ariffin for guide me for finish the project final year.

ACKNOWLEDGEMENT

I am sincerely appreciative to my lecturer, Mr. Ahmad Zainal Taufik bin Zainal Ariffin for serving as my supervisor and for providing guidance while conducting the research and the writing of this „Projek Sarjana Muda" (PSM).

I would like to thanks and convey special appreciation to the laboratory management especially Chassis Performance Testing Laboratory, the lab technicians for their cooperation and support especially to Mr. Mohd Syakir bin Mohtarudin who had been involves in providing technical data on the chassis dynamometer. I also want to thank my beloved family for their continuous support and encouragement in everything I do. All these years of education have been made possible by their support and love.

Last but not least, I thank to everyone who involved directly and indirectly in this project. The sacrifice and commitment given towards me earning my bachelor"s degree are desirable and without them, this PSM thesis would have been impossible.

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INTRODUCTION

1.0 Project Background

In Malaysia majority civilian using a vehicle to go point A to point B, but every vehicle need a fuel to make a vehicle move without lag or problem. There are several type of fuel in Malaysia like RON 95 and RON 97but which one civilian will choose for performance and torque.

This is about final year project will discuss the performance of engine when using different fuel and identify torque, horsepower and emission. Every fuel has a characteristic and unique to make that brand special then other. After that, fuel must clean emission come out from exhausts, but to know how much emission out from exhaust, it must using Exhaust Gas Analyzer to know quantity of emission. When get a result for torque, horsepower and emission level, which result will convert into graph.

1.1 Objective

The objectives for this project are:

I. To study the torque and horsepower produced by engine.
II. To study the exhaust emission an engine.

1.2 Project Scope and Limitations

Below the scopes for this project are:

I. Using different petrol fuel with RON or Research Octane Number is chosen as the octane rating that will be used.

II. Based on two fuel station (Petron and Shell) in Malaysia.

III. For Petron station using petrol fuel type RON95, RON97. Mean while, for Shell station using petrol fuel type RON95and RON97.

IV. Using chassis dynamometer test.

1.3 Problem Statement

To study and know how much torque, emission gas and horsepower when using different type of petrol fuel for Perodua Viva.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction to Crude Petroleum Process

For the most part, unrefined petroleum is warmed and changed into a gas. The hot gasses are passed into the base of a refining section and get to be distinctly cooler as they climb the tallness of the segment. As the gasses cool underneath their breaking point, they consolidate into a fluid. The fluids are then drawn off the refining segment at particular statures, going from substantial lives at the base, crude diesel energizes in the waists, and crude gas at the top. These crude parts are then prepared further to make a few diverse completed items.

Albeit all parts of petroleum discover utilizes, the best request is for gas. One barrel of unrefined petroleum contains just 30-40% fuel. Transportation requests require that more than half of the unrefined petroleum be "changed over" into fuel. To take care of this demand some petroleum portions must be changed over to gas. This might be finished by splitting separating huge particles of overwhelming warming oil and lives; transforming changing sub-atomic structures of low quality fuel particles; and isomerisation reworking a particle so that the item has a similar synthetic equation however has an alternate structure, for example, changing over ordinary butane to isobutene.

2.1 Introduction to Research Octane Number (RON)

The Research Octane Number (RON) is a number that is granted to various evaluations of fuel with present to its capacity to oppose auto-start or known as thumping. RON is dictated by running the fuel in a test motor with a variable pressure proportion under controlled condition, and the outcome is contrasted and blends of iso-octane and n-heptanes. Alternate words, is a rating used to quantify a powers thumping resistance in start inward burning motors. The lower of RON the less demanding it gets to be for energizes to touch off in the motor. In this way, the powers with a higher octane number will dispose of thumping, which have high pressure proportion and acquire control in the motor. The following are the essential about accessible fuel.

2.2 Internal Combustion Engine

This section will explain how the working principle in combustion chamber for 4-stroke engine.

2.2.1 Working Principle of Internal Combustion Engine

Interior burning motor is warmth motor that believers compound vitality in a fuel into mechanical vitality, ordinarily made accessible on turning yield shaft. Concoction vitality of fuel is initially changed over to warm vitality by method for ignition or oxidation with air inside the motor. This warm vitality raises the temperature and weight of the gasses inside the motor and the high weight gas then grows against the mechanical instrument of the motor. This development is changed over by the mechanical linkages of the motor to the turning crankshaft, which is the yield of the motor. The crankshaft, thusly, is associated with a transmission or power prepares to transmit the pivoting mechanical vitality to the craving last utilizes. The vast

majority of the interior burning motor is responding motors having cylinders that respond forward and backward in barrels inside the motor.

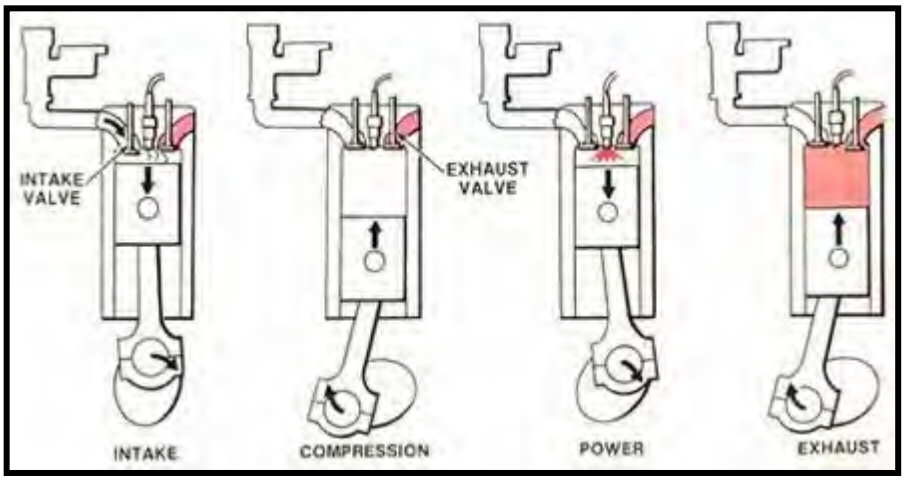

Figure 2.1: Four Strokes Combustion Engine (Pulkrabek, 2004)

a) Intake Stroke or Induction

The cylinder moves descending that draws an ignitable blend of fuel and air past the throttle and admission valve into the barrel. At this stroke, the admission valve open and the fumes valve shut.

b) Compression Stroke

A mid the Compression stroke, the cylinder moves upward, packing the fuel/air blend. The whole valve shut, and it will raise the temperature of the blend. A start touches off the blend toward the end of the pressure stroke.

c) Expansion or Power Stroke

At power feed, the start plug fires, lights the compacted fuel. As the fuel blazes it extends, driving the cylinder descending. The extension or power strokes result from burning of the fuel-air-blend. At this stroke, both admission and fumes valve shut.

d) Exhaust Stroke

At the base of the power stroke, the fumes valve is opened by the cam/lifter instrument. The upward stroke of the cylinder drives the depleted fuel out of the barrel. At this stroke, the admission valve shut and the fumes valve open.

e) Compression Stroke

A mid the Compression stroke, the cylinder moves upward, packing the fuel/air blend. The whole valve shut, and it will raise the temperature of the blend. A start touches off the blend toward the end of the pressure stroke

2.3 Introduction of Dynamometer

A dynamometer or "dyno" for short, is a machine used to gauge torque and rotational speed (rpm) from which control delivered by a motor, engine or other turning prime mover can be figured. A dynamometer can likewise be utilized to decide the torque and power required to work a determined machine, for example, a pump. All things considered, motoring or driving dynamometer is utilized. A dynamometer that is intended to be driven is called a retention or latent dynamometer. A dynamometer that can either drive or retain is known as a general or

dynamic dynamometer. Notwithstanding being utilized to decide the torque or power attributes of a machine under test, dynamometers are utilized in various different parts. In standard discharges testing cycles, for example, those characterized by the us natural assurance office, dynamometers are utilized to give mimicked street stacking of either the motor (utilizing a motor dynamometer) or full powertrain (utilizing a case dynamometer).

2.4 Working of Principle Dynamometer

An engrossing dynamometer goes about as a heap that is driven by the prime mover that is under test. The dynamometer must have the capacity to work at any speed, and load the prime mover to any level of torque that the test requires. A dynamometer is normally outfitted with a few method for measuring the working torque and speed. The dynamometer must assimilate the power created by the prime mover. The power consumed by the dynamometer should by and large be dispersed to the encompassing air or exchanged to cooling water. Regenerative dynamometers exchange the ability to electrical cables.

Dynamometers can be outfitted with an assortment of control frameworks. On the off chance that the dynamometer has a torque controller, it works at a set torque while the prime mover works at whatever speed it can achieve while building up the torque that has been set. On the off chance that the dynamometer has a speed controller, it builds up whatever torque is important to compel the prime mover to work at the set speed. A motoring dynamometer goes about as an engine that drives the hardware under test. It must have the capacity to drive the gear at any speed and build up any level of torque that the test requires. Just torque and speed can be measured control must be figured from the torque and speed.

2.5 Chassis Dynamometer

A suspension dynamometer some of the time alluded to as a moving street, measures control conveyed to the surface of the "drive roller" by the drive wheels. The vehicle is regularly stopped on the roller or rollers, which the auto then turns, and the yield measured along these lines.

Cutting edge roller-sort frame dyno system, which enhances footing and repeatability, when contrasted with the utilization of smooth or knurled drive rollers. Chassis dynamometers can be settled or compact and can do considerably more than show RPM, drive, and torque. With cutting edge gadgets and snappy responding, low dormancy dyno frameworks, it is presently conceivable to tune to best power and the smoothest keeps running progressively. Different sorts of body dynamometers are accessible that dispense with the potential for wheel slippage on old style drive rollers, connecting straightforwardly to the vehicle centers for direct torque estimation from the hub.

Engine vehicle outflows improvement and homologation dynamometer test frameworks frequently coordinate emanations examining, estimation, motor speed and load control, information obtaining, and security checking into a total test cell framework. These test frameworks as a rule incorporate complex emanations examining hardware, (for example, consistent volume samplers and crude fumes gas test arrangement frameworks) and analyzers. These analyzers are considerably more delicate and much quicker than a common versatile fumes gas analyzer. Reaction times of well under one moment are regular, and are required by numerous transient test cycles. In retail settings it is likewise regular to tune the air-fuel proportion utilizing a wideband oxygen sensor that is diagramed alongside the RPM.

2.6 Exhaust Emission

Gases from the exhaust are product of combustion of fuel and air. The gas later will be released into the air through the exhaust pipe. Some of the gases that being released from the exhaust are contained oxygen, nitrogen oxide, carbon dioxide, carbon monoxide and hydrocarbons. Most of the gases are harmful to living life and the environment. The gases exhaust emission can be the parameter to the engine performance.

2.6.1 Carbon Monoxide (CO) Emission

CO is a dry, noxious gas, and it must be limited. CO comes about because of fragmented ignition of fuel and is discharged straightforwardly from vehicle tailpipes. Broadly and, especially in urban zones, the dominant part of CO emanations to surrounding air originate from versatile sources. CO can bring about hurtful wellbeing impacts by decreasing oxygen conveyance to the body's organs (like the heart and cerebrum) and tissues. At to a great degree abnormal state, CO can bring about death. Other than the perfect ignition handle that joins carbon (C) and oxygen (O2) to CO2, inadequate burning of carbon prompts to the arrangement of CO. The development of CO happens when the oxygen presents amid burning is deficient to frame CO2 (Canakci et al 2009). A falling pattern of CO outflow can be expected as the motor speed increments

2.6.2 Nitrogen Oxide (NOx) Emission

Nitrogen Oxides are a group of harmful, profoundly receptive gasses. These gasses frame when fuel is singed at high temperatures. NOx contamination is transmitted via cars, trucks and different non-street vehicles (e.g., development hardware, water crafts, and so on.) and also mechanical

sources, for example, control plants, modern boilers, concrete ovens, and turbines. NOx frequently shows up as a caramel gas. It is a solid oxidizing specialist and assumes a noteworthy part in the climatic responses with unstable natural mixes (VOC) that deliver ozone (brown haze) on hot summer days.

2.6.3 Carbon Dioxide (CO2) Emission

Carbon dioxide (CO2) is the essential nursery gas transmitted through human exercises. In 2013, CO2 represented around 82% of all U.S. nursery gas emanations from human exercises. Carbon dioxide is normally present in the climate as a major aspect of the Earth's carbon cycle (thenatural dissemination of carbon among the air, seas, soil, plants, and creatures). Human exercises are changing the carbon cycle both by adding more CO2 to the climate and by impacting the capacity of normal sinks, similar to woodlands, to expel CO2 from the air. While CO2 emanations originate from an assortment of common sources, human-related outflows are in charge of the expansion that has happened in the environment since the mechanical upheaval. CO2 is an ordinary result of ignition. In a perfect world, burning of a hydrocarbon fuel ought to create just CO2 and water (H2O) (Sayin et al., 2009). Consequently, CO2 sum increments while HC and CO discharge sums diminishing and this means that a fruitful ignition.

2.6.4 Hydrocarbon (HC) Emission

Hydrocarbon in fumes vehicle emanation can be expected as the unburned fuel that delivered by the incline and rich blend fuel ignition which be a squandered of fuel. The vast majority of the UHC are brought on by unburned fuel air blend, though alternate sources are the motor oil and