FUEL-SAVING DEVICE ROD ELECTRODE BASED ON GASOLINE FOR FUEL CAR

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A report submitted in partial fulfillment of the requirements

for the award of the

Diploma of Mechanical Engineering

Faculty of Mechanical Engineering

University Malaysia Pahang

NOVEMBER 2010

SUPERVISOR'S DECLARATION

I hereby declare that I have checked this project report and in my opinion this project is satisfactory in terms of scope and quality for the award of the Diploma of Mechanical Engineering.

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STUDENT'S DECLARATION

I hereby declare that this report entitled "Fuel-saving Device Rod Electrode Based On Gasoline Fuel Car" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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DEDICATION

Praise to Allah because I can finish this report before the submission date. This report is dedicated Allah whose guidance, help and grace was instrumental in making this become reality. To my beloved parents, Mrs. Zainah binti Abd Rahman, family and friends. Without their effort, my pursuit of higher education would not have been possible and I would not had the chance to study in this mechanical course. I also dedicated to Engineer Instructor, Mr Muhamad Imran Bin Mohmad Sairaji and Mr Mohd Aminuddin bin Ayob for their helping in completed this final year project.

Also to my supervisor, Dr. Gigih Priyandoko and entire lecturers. Without their wise suggestions, helpful guidance and direct assistance, this project not ever been finished.

ACKNOWLEDGEMENTS

I am grateful and would like to thank you to my supervisor Dr. Gigih Priyandoko for his advice, invaluable guidance, and constant support and continue encouragement in preparing final year project report. In addition, I am appreciating his consistent support from the first day I do the final year project. I also sincerely appreciate and thankful for the spent time and correcting my mistake.

Besides that, my sincere thanks go to all staff of the Mechanical Engineering Department, UMP, who helped me in many ways and also thank you for the lab mates that also give a hand to do this project.

I acknowledge my sincere indebtedness and gratitude to my parents for their love, dream and sacrifice throughout my life. I would like to acknowledge their comments and suggestions, which was crucial for the successful in my study.

Finally, millions of thankful for everyone who help me to finish this project with directly or not.

ABSTRACT

This final year project is about fuel-saving device on gasoline that are design to help the user on how to save the gasoline for car. The objective of this project is to design and experiment fuel-saving device rod electrode based on gasoline fuel car by using electrolysis method. The plastic container is used as the devices of this project where are functional as a method to collect the hydrogen gas to flow to the manifold of the car. The hydrogen gas is the device for the combustion in the engine of the car. It also as the device to help users in reducing uses of fuel for car. The circuit is formed to show how the hydrogen gas is produced. The circuit is build to show by using the electrolysis, the hydrogen gas can be produced and supplied into the manifold of the car. The circuit firstly is set up by tied the both of the stainless steel with the coil. It is function as the electrode in the plastic container which is cathode (-) and anode (+). Then the circuit is tested with the battery water mixed with sodium bicarbonate to test whether the stainless steel can produce bubble that is the hydrogen gas. Then, the production of hydrogen gas will flow through the tube to the manifold of the eddy current dynamometer. To get the result from this experiment, the eddy current dynamometer is used that is speed versus time. The result will be interpreted by the eddy current dynamometer readings that are discussed and presented. A conclusion on experimented project are presented and the problem faced are discussed.

ABSTRAK

Projek tahun akhir ini membentangkan mengenai alat penjimatan minyak yang direka cipta untuk menjimatkan minyak kereta. Objektif projek ini adalah merekacipta dan menjalankan eksperimen mngenai alat penjimatan minyak iaitu rod electrode berdasarkan gasoline bahan bakar untuk kereta yang menggunakan kaedah elektrolisis. Bekas plastik digunakan sebagai alat untuk projek ini di mana berfungsi sebagai satu kaedah untuk mengumpul gas hidrogen yang terkumpul dan disalurkan ke manifold kerete. Hidrogen adalah gas yang menjadi bahan bakar di dalam enjin kereta. Ia juga untuk membantu penjimatan minyak ketika pembakaran enjin sedang berlaku. Litar yang dibina adalah menunjukkan bahawa dengan menggunakan electrolysis, gas hydrogen dapat dihasilkan dan disalurkan ke manifold kereta. . Permulaan untuk menjalankan experiment ini adalah dengan mengikat kedua-dua rod stainless steel dengan menggunakan dawai besi dan salah satu dijadikan sebagai katod (-) dan anod (+).Kemudian, ia diuji dengan mencampurkan air bateri dan soda bikarbonat untuk diuji samada boleh menghasilkan buih-buih gas hydrogen. Soda bicarbonate adalah salah satu bahan untuk menghasilkan gas hydrogen. Selepas itu, bekas palastic itu disambungkan dengan Eddy Current Dynamometer manifold bagi menjalankan eksperimen ini. Keputusan yang didapati ditunjukkan oleh bacaan pada Eddy Current Dynamometer bagi kelajuan melawan masa. Bacaan yang diperolehi daripada Eddy Current Dynamometer dibincangkan dan dinyatakan. Kesimpulan daripada hasil experiment ditunjukkan disamping masalah-masalah yang dihadapi semasa menjalankan projek ini dibincangkan.

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-	Cathode
+	Anode
Cu	Copper
HHO	Water
Rpm/min	Speed
%	Percent
$NaHCO_3$	Sodium Bicarbonate
mm	Millimeter
cm	Centimeter
N/m^2	Torque
s	Time

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Final year project is one of the subjects of this semester. This subject carries four hour credits. In this subject, a project needs to fulfill by the students. The current project is to fabricate, design and experimented fuel-saving device on gasoline for fuel car by using the electrolysis method. Final year project are guided by the instructor, one student is required to accomplishing this project. The student must have hardworking and high discipline attitude. He/she must also willingly to learn and self-motivated. This project involves electrolysis experimented to produce hydrogen. This experiment also testing by using the eddy current dynamometer to get the result on how much the fuel can be saved by consumers. Overalls, this project will involve the development of skill in conducting an experiment and also develop operating the Eddy Current Dynamometer.

1.2 Problem statement

Today, the price of the petrol is increases. They have to buy the 1 liter petrol for RM 2.10. It becomes problem for those who want to have a long journey. From this problem, the saving fuel device is developing to find the way on how to save the fuel car. So, from these problems, the problem statement are create on how to make the time taken become longer than usual to finish the amount of petrol. Besides that, to find the way on how to produce hydrogen to prevent this problem.

1.3 Project Objective

The specific objective of this project is:

The main objective of this final year project is to design and experiment fuel-saving device rod electrolyte based on gasoline for fuel car by using the electrolysis method.

1.4 Project Scope

The scopes of the project are:

a) The lengths of electrode are 100mm, 125mm and 150mm.
b) The amount of petrol used is 200mL.
c) The amount of sodium bicarbonate is 200mg.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Fuel-saving device on gasoline fuel car is a device that is designed to minimize the uses of gasoline fuel car. Nowadays, price for the fuel car is increase and the user need to pay the expensive fuel for a few liters. One liter of gasoline is about RM2.10. It is a bit expensive for user. From this problem, the device is designed to help the user and to manage this problem. Fuel saving device is a circuit that is produce hydrogen by using the battery water. The circuit is build to show by using the electrolysis, the hydrogen gas can be produced and supplied into the manifold of the car. The circuit firstly is set up by tied the both of the stainless steel with the coil. It is function as the electrode in the plastic container which is cathode (-) and anode (+). Then the circuit is tested with the car battery to test whether the stainless steel can produce bubble that is the hydrogen gas. When the hydrogen is produced, the gas is flow through the tube to the manifold. To get the result from this experiment, the eddy current dynamometer is used.

2.2 Existing Design.

2.2.1 Design 1 (Copper Plate)

Figure 1.1 Copper Plate

The electrolysis by using copper plate as the electrode is a way to produce hydrogen in the container. The hydrogen is produced when the battery water is pour into the container and connected to the battery car as the supply voltage for the circuit. It is also connected to the bulb to show it function well.

Copper is a chemical element with the symbol Cu andatomic number 29. It is a ductile metal, with very high thermal and electrical conductivity. Pure copper is rather soft and malleable, and a freshly exposed surface has a pinkish or peachy color. It is used as a thermal conductor, an electrical conductor, a building material, and a constituent of various metal alloys.

2.2.2 Design 2 (Encircle with Iron Coil)

Figure 1.2 Encircle with Iron Coil

The electrolysis by using the iron coil is the way to produce hydrogen gas. The device used to convert water into a source of energy is hydrogen generator. Environmentalists will be happy if all people will use hydrogen power. This is precisely because the hydrogen burns cleanly. It does not emit harmful chemicals to the air as gasoline does.

The iron coil is the good conductor. The electricity can pass through it and can generate the battery water to produce hydrogen. It is also easy to set up this experiment. The method of electrolysis is cheap and the engine no needs to be changed because it only needs to connect with the manifold of the car.

Brown's gas has the power of hydrogen, just about the same with the power of hydrogen bombs. It is in this nature of hydrogen that the energy is drawn from. It has the strength of hydrogen and yet it is very stable as the chemical component of water, which is hydrogen dioxide.

Believe it or not, hydrogen fuel can run a truck. It is also called HHO and if one does not want to use it as a main source of energy, it may serve as a blend with gasoline. Since hydrogen does not burn that easily, this translates into gasoline burning lesser than what is required. As such, mileage is increased.

2.3 Types of Material Used for Existing Design

2.3.1 Copper

Physical Properties of copper is malleable. That is, it can be bent and shaped without cracking, when either hot or cold. It can be rolled into sheets as thin as 1/500 of an inch.

Copper also is ductile, that is, it can be drawn out into thin wire. A copper bar 4 inches thick can be heated, rolled, then drawn into a round wire so thin that it is thinner than a human hair. This wire is 20 million times longer than the original bar.

Industry valued copper for these properties. Copper is second only to silver in its ability to conduct electricity, but silver is too expensive for this sort of use. Bronze and brass, however, do not conduct electricity as well as pure copper.

Besides electricity, copper also is an excellent conductor of heat, making it an important metal in cookware, refrigerators, and radiators.

2.3.2 Iron

Iron is the most frequently encountered metal in daily life, always in the form of manufactured objects, and usually covered with a protective coating or buried deep within the object. Concrete structures contain essential reinforcing iron; electrical machines, including transformers, depend on iron.

Automobiles are mainly iron; "tin" cans are iron covered with thin coatings of tin or lacquer; fasteners, such as the nails and screws used in wooden construction, are usually iron. This list can easily be extended with a little thought.

Iron is an excellent and versatile material of construction--strong, tough, easily formed and worked, and, very importantly, cheap compared to the alternatives. Plastics give it competition, especially in products that must be manufactured at the lowest cost where strength and durability are not the primary concerns, such as modern American automobiles.

2.4 Eddy Current Dynamometer

A **dynamometer** or **"dyno"** for short is a device for measuring force, moment of force (torque), or power. For example, the power produced by an engine, motor or other rotating prime mover can be calculated by simultaneously measuring torque and rotational speed(RPM).

In addition to being used to determine the torque or power characteristics of a machine under test (MUT), dynamometers are employed in a number of other roles. In standard emissions testing cycles such as those defined by the US Environmental Protection Agency (US EPA), dynamometers are used to provide simulated road loading of either the engine (using an engine dynamometer) or full powertrain (using a chassis dynamometer).

In fact, beyond simple power and torque measurements, dynamometers can be used as part of a tested for a variety of engine development activities such as the calibration of engine management controllers, detailed investigations into combustion behavior and tribology. The advantages eddy current dynamometers are precise control, low maintenance and widely accepted in the automotive industry.

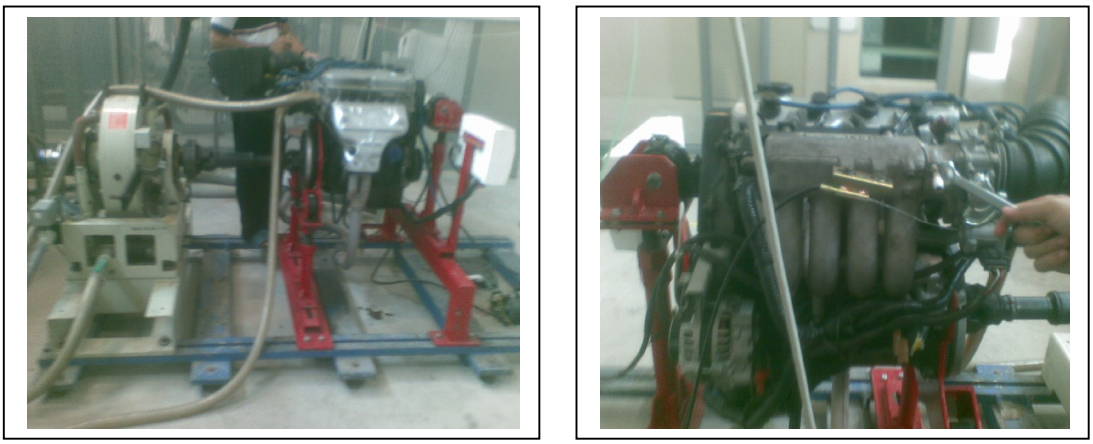

Figure 1.3 : Eddy Current Dynamometer

2.5 Reviews on Selected Material

2.5.1 Stainless Steel

In metallurgy, stainless steel, also known as inox steel or inox, is defined as a steel alloy with a minimum of 10.5 or 11% chromium content by mass. Stainless steel does not stain, corrode, or rust as easily as ordinary steel (it stains less, but it is not stain-proof). It is also called corrosion-resistant steel or CRES when the alloy type and grade are not detailed, particularly in the aviation industry. There are different grades and surface finishes of stainless steel to suit the environment to which the material will be subjected in its lifetime. Common uses of stainless steel are cutlery and watch cases and bands.

Stainless steel differs from carbon steel by the amount of chromium present. Carbon steel rusts when exposed to air and moisture. This iron oxide film (the rust) is active and accelerates corrosion by forming more iron oxide. Stainless steels have sufficient amounts of chromium present so that a passive film of chromium oxide forms which prevents further surface corrosion and blocks corrosion from spreading into the metal's internal structure.

Stainless steel is 100% recyclable. An average stainless steel object is composed of about 60% recycled material of which approximately 40% originates from end-of-life products and about 60% comes from manufacturing processes.

2.5.2. Plastic

A **plastic** material is any of a wide range of synthetic or semi-synthetic organic solids used in the manufacture of industrial products. Plastics are typically polymers of high molecular mass, and may contain other substances to improve performance and/or reduce costs. Monomers of plastic are either natural or synthetic organic compounds.

The word plastic is derived from the Greek (plastikos) meaning capable of being shaped or molded. It refers to their malleability, or plasticity during manufacture, that allows them to be cast,pressed, or extruded into a variety of shapes—such as films, fibers, plates, tubes, bottles, boxes, and much more.

The physical properties of plastics are transparency, flexibility, elasticity, permeability, water resistant, electrical resistance and specific gravity.

2.5.3. Sodium Bicarbonate

Sodium bicarbonate or sodium hydrogen carbonate is the chemical compound with the formula $NaHCO_3$. Sodium bicarbonate is a white solid that is crystalline but often appears as a fine powder. It has a slightly salty, alkaline taste resembling that of washing soda (sodium carbonate).

Since it has long been known and is widely used, the salt has many related names such as baking soda,bread soda,cooking soda,bicarbonate of soda. Colloquially, its name is shortened to sodium bicarb, bicarb soda, or simply bicarb.