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Literature Review on the Fabrication of Hybrid Engine Vehicle

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Abstract: ***A hybrid vehicle uses two or more distinct types of power, such as internal combustion engine + electric motor, e.g. in diesel-electric trains using diesel engines and electricity from overhead lines, and submarines that use diesels when surfaced and batteries when submerged. Other means to store energy include pressurized fluid, in hydraulic hybrids.***
A water-fuelled car is an automobile that hypothetically derives its energy directly from water. Water-fuelled cars have been the subject of numerous international patents, newspaper and popular science magazine articles, local television news coverage, and websites. The claims for these devices have been found to be pseudoscience and some were found to be tied to investment frauds. These vehicles may be claimed to produce fuel from water on board with no other energy input, or may be a hybrid claiming to derive some of its energy from water in addition to a conventional source (such as gasoline).
Water is fully oxidized hydrogen. Hydrogen itself is a high-energy, flammable substance, but its useful energy is released when water is formed. Water will not burn. The process of electrolysis can split water into hydrogen and oxygen, but it takes as much energy to take apart a water molecule as was released when the hydrogen was oxidized to form water. In fact, some energy would be lost in converting water to hydrogen and then burning the hydrogen because some waste heat would always be produced in the conversions. Releasing chemical energy from water, in excess or in equal proportion to the energy required to facilitate such production, would therefore violate the first or second law of thermodynamics.
Keywords: Ammonia hydroxide, Hydrogen-Hydrogen-Oxygen (HHO) generator, Hybrid Vehicle(HEV), potassium hydroxide (KOH), water molecule, energy.

I. INTRODUCTION

A hybrid vehicle uses two or more distinct types of power, such as internal combustion engine+ electric motor, e.g. in diesel-electric trains using diesel engines and electricity from overhead lines, and submarines that use diesels when surfaced and batteries when submerged. Other means to store energy include pressurized fluid, in hydraulic hybrids

Hydrogen and HHO generator are seen by many as one of the key solutions for the 21 century, by allowing a clean efficient production of power to reduce air pollution from several primary energy sources such as fossil fuel. Even though energy systems based on hydrogen can build bridges to the future, but the challenge of planning a cost-effective, and efficient transition is hugely difficult. Furthermore, very large capital and human investments will need many years before coming to make a great achievement. However, starting to explore this path result in a more sustainable future. In a fact, hydrogen is not a primary energy source. It is an energy carrier.

Initially, it is produced by using technologies existing energy systems such as the gamification technology based on different conventional primary energy carriers and sources like coal and natural gas, or by building a renewable energy system that is more sustainable and reliable will benefit from solar and wind energy by using electrolysis technologies. Many experiments were carried out to optimize the performance of a dry HHO cell through changing the variety of setups such as alternating the distance between the plates, by using different electrolyte concentrations, and different current values.

The electrolytes with different concentrations, and how much of the current value across the electrolyte to produce hydrogen in a cell are focused by Rusdianasari & Dewi. Abhishek et al have studied the basic properties of gas generated through electrolysis of water and then used this gas in the bike as a fuel supplement with gasoline by mixing it with air. The HHO reactor was made from high grade stainless steel and NaOH was used as an electrolyte. If there is a possibility to produce, hydrogen through water electrolysis by using a Dry HHO Cell and studying its potential by a design, a building, an experiment, and also trying development in the cell to produce much more hydrogen for longer period.

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II. PROBLEM STATEMENT

To Implementation in the existing technology and to show the innovative idea on existing system. To make use of HHO cell that is readily available and chipset. To prepare and efficient and cost effective system.

III.RESEARCH METHODOLOGY

A hybrid automobile is a vehicle that uses a combination of multiple sources of energy. It could be for instance a combustion engine, electric motor and an accumulator, fuel cells, ,electro motor and an accumulator, combustion engine and flywheel etc. to name a few.

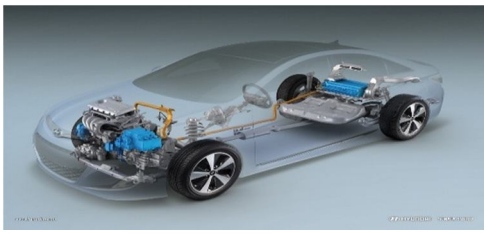


Fig a. vehicle

It's the combination of a combustion engine, electromotor and an accumulator that is the most wide spread and effective for LCE. That's why we are going to focus on this concept and will describe its advantages.

The effectiveness of today's combustion engines runs in a range of 30-40%. Gas (petrol) engines' effectiveness is on the bottom on the range while the diesel enginesare somewhat better. This value is mostly based on the effectiveness of the thermodynamic cycle itself which has some clear physical limitations. Therefore we cannot expect to see much of an improvement in the future. The main problem is that the current effectiveness is at its maximum and is reached only when the engine works under optimal conditions.

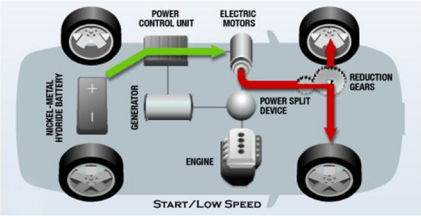


Fig b. hybrid engine arrangement

This effectiveness can therefore be reached only rarely under the normal working conditions and the overall effectiveness then is significantly lower. The extreme case here is an operation in idle position when the engine consumes fuel while the car doesn't perform any activity. As the combustion engine can acceptably perform only at a limited range of RPM the use of transmission is necessary.

The transmission brings another not insignificant energy loss. The number of gears is usually also limited which creates yet another reason why the engine cannot work at its optimum conditions. There are also continuous transmissions but their effectiveness is even somewhat lower.

The picture illustrates a schema of a series hybrid vehicle.

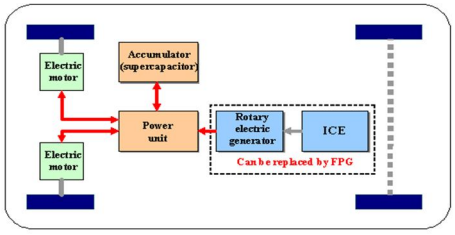


Fig c. a series hybrid vehicle

It is clear that the use of LCE in mass production is ideal. It can increase car's effectiveness as well as decrease its weight. More compact design then allows for a less traditional placement of the unit - for instance under the vehicle floor.

IV.LITERATURE SURVEY

1) *Vivek Khandelwal5 #1Assistant Professor of Mechanical Engineering, New Horizon College of Engineering, Bangalore, Karnataka, India, "DESIGN AND FABRICATION OF HYDROGEN GENERATOR", e-ISSN: 2455-2585 Volume 4, Issue 6, June-2018 IJTIMES-2018@All rights reserved 1202 [1]:* In the previous couple of years automobile organizations have been hunting down innovative focal points to build fuel mileage keeping in mind the end goal to ensure the earth. Water electrolysis is one of the most straightforward strategies utilized for hydrogen generation. It can deliver hydrogen utilizing just sustainable power source as well. To extend the utilization of water electrolysis, it is required to lessen vitality utilization, cost, and support of ebb and flow electrolyzers, and then again to build their efficiency, toughness, and security. Different results looked because of utilization of gas powers like air contamination and its extinctive nature, the HHO generator is the best substitution for it. This paper is tied in with outlining an effective Hydrogen-Hydrogen-Oxygen (HHO) generator that produces Hydrogen gas which can be utilized for additionally purposes. In our senior thesis we will endeavor to address this issue by planning and building a HHO generator.
2) *TS De Silva, L Senevirathne and TD Warnasooriya, 2015, 2(4): 1-7, "HHO Generator – An Approach to Increase Fuel Efficiency in Spark Ignition Engines" [2]:* This paper is all about designing an efficient Hydrogen-Hydrogen-Oxygen (HHO) generator, that produces Hydroxy gas which can be used to increase the fuel efficiency in an internal combustion engine. In a combustion engine, high pressure products of combustion expand through a turbine or a piston in order to generate power. In this scenario the high pressure products act as a working fluid. Currently there are three types of combustion engines in practice; Spark ignition engine, Diesel engine and Turbine engine. In these engines the fuel burning process seems to be very primitive. Hence, unburned fuel remains after the burning process. This causes the air pollution which is one of the biggest challenges that researches face in the automobile industry. HHO generator is an efficient approach that used to increase the fuel efficiency in a combustion engine by increasing the energy produced per mole of fuel during the ignition process.
3) *Samuel Pamford Kojo Essuman*,Andrew Nyamful, Vincent Yao, Agbodemegbe, Seth Kofi Debrah, "Design and Development of an Oxyhydrogen Generator for Production ofBrown's (HHO) Gas as a Renewable Source of Fuel for the Automobile Industry", 2319 – 6734, ISSN (Print): 2319 – 6726, May 2019 [3]:* This research work seeks to design and develop an oxyhydrogen generator for HHO gas production. Key parameters consideredin this study includeelectrode area, electrodes spacing, electrodesurface conditioning, and electrode configuration as well as the efficiency of thegenerator. The constructed generator consisted of 26plates made up of 3 anodes, 3 cathodes and 20 neutral plateswitheach having dimension of 10cm x 10 cm. The adjacent plates was spaced at a distance of 2 mm. The efficiency of the constructed generator was evaluated using0.01 M-0.03 M strengths of KOHat a constantvoltage of 13 V.The Results showedan optimum efficiency of 11.9 % when the HHO generator was run using 0.02 M KOHat 13 V for 1 hour.
4) *Z Jannah* and S H Susilo, Design of HHO generators as producers of water fuel (HHO generator product analysis based on electric current and catalyst), ATASEC 2020 [4]:* One of the fossil fuels is petroleum fuel. Petroleum is a non-renewable natural resource. Various aspects of life have felt its effects, where fuel oil has begun to experience scarcity. The higher price of fuel oil should make us realize that the amount of oil reserves has begun to run low. The purpose of this study was to determine the effect of electrodes, current strength, and concentration of NaHCO3 on the HHO gas generator output. HHO electrode generator material made of 594luminium and brass. The electrode's shape is rectangular with a size of 250 mm x 400 mm, with a gasket seal. The test begins with the HHO gas pressure test. The independent variable used is 594luminium and brass electrode variations. The electric current given is 20A, 30A, 40A, and the amount of 5-25% NaHCO3 catalyst. Then proceed with 594luminium the pressure obtained on the HHO gas flow rate. To test the HHO gas flow rate carried out with a duration of 1 to 3 minutes in each treatment, the measurement of the discharge using a gas regulator to determine the flow rate of H2 and O2 produced. The results showed that the lowest gas discharge value was on 594luminium electrodes with a current of 20A, i.e., 0,00033554 m3/s, while the highest discharge value on brass electrodes with a current of 50A was 0,001657 m3/s. It shows that the better the metal element contained in the electrodes and the higher the current applied, the greater the flow of H2 and O2 gas flow.
5) *AADITYA1 ABHISHEK, AJAY, VIPIN, DEEPAK, "HYDROGEN POWERED PETROL ENGINE (HHO ENGINE)", International Journal of Scientific & Engineering Research, Volume 6, Issue 5, May-2015 [5]:* In this paper we have studied the basic properties of gas generated through electrolysis of water and then used this gas in the a bike as a fuel with gasoline by mixing it with air. This results the increased mileage of bike 30 to 60% and reduce the polluting contents from the exhaust gases. The threat posed by climate change and the striving for securities of energy supply are issues high on the political agenda

these days. Governments are putting strategic plan motion to decrease primary energy use, take carbon out of fuels and facilitate modal shifts. Taking a prominent place in these strategic plans is hydrogen as a future energy carrier. Energy stored in hydrogen would be available at any time and at any place on Earth, regardless of when or where the solari radiance, the hydropower, or other renewable sources such as biomass, ocean energy or wind energy was converted.. Hydrogen gas combined with the standard air/fuel mixture increases the mileage. This form of alternative fuel is provided by a hydrogen generator mounted in the vehicle. Once set up is ready, the hydrogen gas (fuel) will be produced from water, an electrolyte compound, and electricity supplied from a battery provided. Here we are designing a mixed fuel two wheeler engie.ie in a conventional SI engine we are incorporating traces of hydrogen along with gasoline in order to minimum consumption of gasoline as well as to increase the power of vehicle. Here in addition, a hydrogen generating unit is made to produce hydrogen .It is actually an electrolysis unit having high grade stainless steel/graphite/semiconductors as electrodes in a closed container and mixture of distilled water & suitable ionic solution(KOH or NAOH) as electrolyte. Power for electrolysis is taken from an additional battery provided (12V).This battery can be recharged from a dynamo/alternator/motor.

6) *N N Patil1 , C B Chavan, A S More and P Baskar, "Generation of oxy-hydrogen gas and its effect on performance of spark ignition engine", 14th ICSET-2017 [6]:* Considering the current scenario of petroleum fuels, it has been observed that, they will last for few years from now. On the other hand, the ever increasing cost of a gasoline fuels and their related adverse effects on environment caught the attention of researchers to find a supplementary source. For commercial fuels, supplementary source is not about replacing the entire fuel, instead enhancing efficiency by simply making use of it in lesser amount. From the recent research that has been carried out, focus on the use of Hydrogen rich gas as a supplementary source of fuel has increased. But the problem related to the storage of hydrogen gas confines the application of pure hydrogen in petrol engine. Using oxy-hydrogen gas (HHO) generator the difficulties of storing the hydrogen have overcome up to a certain limit. The present study highlights on performance evaluation of conventional petrol engine by using HHO gas as a supplementary fuel. HHO gas was generated from the electrolysis of water. KOH solution of 3 Molar concentration was used which act as a catalyst and accelerates the rate of generation of HHO gas. Quantity of gas to be supplied to the engine was controlled by varying amount of current. It was observed that, engine performance was improved on the introduction of HHO gas.

7) *Indah Puspitasari1*, Noorsakti Wahyudi2, Yoga Ahdiat Fakhrudi3, Galih Priyo Wicaksono4, "Design of Generator HHO Dry Cell Type and Application on 110 Cc Engined Vehicles Towards Gas Emissions", ICIASGA 2020 [7]:* The HHO generator is a tool that works on the principle of water electrolysis to produce HHO gas, which is a gas consisting of 2 hydrogen molecules and 1 oxygen molecule where the gas can be used as fuel. The number of holes on the plate electrodes affects the amount of discharge and the efficiency of the HHO generator. Therefore, a study was conducted regarding the number of holes on the electrode plate. The parameters measured were voltage, electric current, electrolyte temperature in the reservoir tank, electrolyte temperature in the HHO gas cylinder, and the HHO gas discharge. Whereas what is calculated is the power required for the HHO generator, the production rate, and the efficiency of the HHO generator. Furthermore, the HHO generator was applied to a 110cc vehicle to measure the level of exhaust emissions. Based on the results of the study, the best variation of HHO generators is found in the hole plate electrode 2 with the required power of 180.78 watts and an efficiency of 63.8%. The lowest CO emission levels were in the 2 holes variation, namely 4.01%, and the lowest HC emission levels were in the 4 holes variation, namely 892 ppm.

V. CONCLUSION

Based on the research that has been done, it can be concluded that:

1) The effect of electrodes with a variation of 2 holes, 4 holes and 9 holes on power performance, production rate, and efficiency of dry cell type HHO generators, namely:

a) The dry cell type HHO generator with perforated plate electrodes has different power consumption in each variation, the power consumption tends to increase from the initial minutes to the peak and begins to decrease as the testing time increases and the temperature in the generator electrolyte increases. And the more power holes needed, the more it is needed

b) The more holes the greater the production rate that is generated. Due to the more holes, the larger the area of concentration of the voltage so that it speeds up the rate of HHO gas formation.

c) The more holes, the greater the efficiency produced and the higher the gas produced.

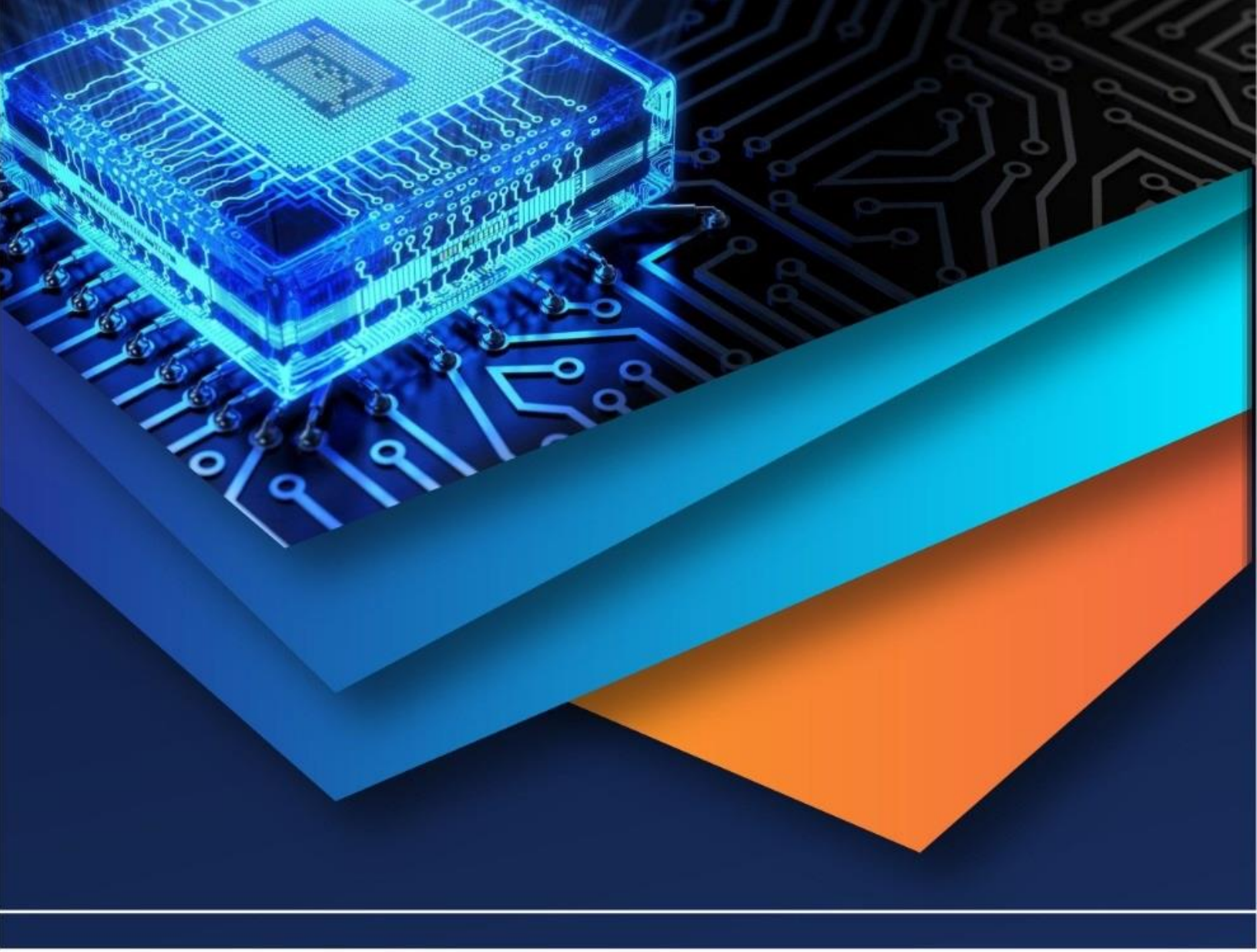
2) The lowest CO emission is in the variation of hole plate 2, namely 4.40%. Meanwhile, the lowest HC emission is in the variation of hole plate 4, which is 929 ppm.

VI. ACKNOWLEDGEMENT

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