

A Review of Four Stroke Engine Run On Hydrogen, Instead of Gasoline

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ABSTRACT

In the past few years automotive companies have been searching for technological advantages to increase fuel millage in order to protect the environment, while still providing an enjoyable driving experience for their customers. With gas prices on the rise, the average American wants a car that can do everyday activities whilst spending the least amount of fuel possible. Not only customers are demanding for better gas millage, but the government as well. Oxy-Hydrogen gas has recently been introduce to the auto industry as new source of energy. The present work purpose the design of a new device attached to the engine to integrate an HHO production system with gasoline engine. In fact, President Obama passed the Fuel Economy Reform Act, which states that by the year 2025 new cars are to have gas millage of 54.5 miles per gallon. In our senior thesis we will attempt to address this issue by designing and building an HHO generator. This generator uses the principle of electrolysis to split water into its two molecules, hydrogen and oxygen, in gas form. This gas will be introduced into the combustion chamber of an engine to increase its power, burn less gas, and exhaust water particles out to the environment.

Keywords : HHO, Hydrogen Cell

I. INTRODUCTION

Hydrogen powered bikes are those in which “HYDROGEN CELL” is used to produce a fraction of power for driving the bike. This results in decrease the fuel(petrol) thus increasing the mileage of the bikes. hydrogen gas kit is latest innovation to increase mileage and power of vehicle.HHO kit.

Combustion of fossil fuels has caused serious problems to the environment and the geopolitical climate of the world. The main negative effects on the environment by Fossil fuel combustion are emissions of NO_x, CO, CO₂, and unburned hydrocarbons. The main negative effect of burning fossil fuel on the geopolitical climate is the lack in supply of these fuels and the effect pollution has on politics.

Hydrogen is a clean fuel which on combustion produces water vapour as the only

product. The use of hydrogen in IC engines not only help increase the efficiency of it but also it helps to reduce pollution and reduce the poisonous gases like carbon monoxide, nitrous oxide etc. The use of hydrogen helps to reduce their use and hence prevent the depletion of these precious natural resources. Through a process of electrolysis water that is in a sealed container under your hood is converting to HO gas. This gas is than introduce to airflow in the intake manifold using your engine vacuum. This gas is than mixed with the fuel providing better mileage.

II. LITERATURE SURVEY

HISTORICAL BACKGROUND

In the beginning, all engine experiments were designed for burning a variety of gases, including natural gas, hydrogen, and propane. There had been many investigations on hydrogen enriched

combustion in internal combustion engines. Rivaz (1807) of Switzerland invented an internal combustion engine with electric ignition which used the mixture of hydrogen and oxygen as fuel. He designed a car for his engine. This was the first internal combustion powered automobile (Bruno 1996, Ackermann 2001, Dutton 2006). Later, he obtained French patent for his invention in 1807. The sketch of his engine taken from his patent is shown in Figure 2.1. Cecil (1820) described a hydrogen engine in his paper entitled "On the application of hydrogen gas to produce a moving power in machinery; with a description of an engine which is moved by pressure of the atmosphere upon a vacuum caused by explosions of hydrogen gas and atmospheric air." In this document, he explained how to use the energy of hydrogen to power an engine and how the hydrogen engine could be built. This is probably one of the most primitive inventions made in hydrogen-fueled engines.

COMBUSTION OF HYDROGEN WITH GASOLINE

Stebar & Parks (1974) investigated about the hydrogen supplementation by means of extending lean operating limits of gasoline engines to control the NOX emissions. They carried out their test in a single cylinder engine. Their results showed that small additions of hydrogen to the fuel resulted in very low NOX and CO emissions for hydrogen-isooctane mixtures leaner than 0.55 equivalence ratio. They also obtained significant improvement in thermal efficiency beyond isooctane lean limit operation. However, HC emissions increased markedly at these lean conditions. They concluded that the success of hydrogen supplemented fuel approach would ultimately hinge on the development of both a means of controlling hydrocarbon emissions and a suitable hydrogen source on board the vehicle. Houseman & Hoehn (1974) presented the first engine dynamometer test results for a modified fuel system based on hydrogen enrichment for a V-8 IC engine. The engine burnt mixtures of gasoline and hydrogen under ultra

lean conditions and yielded extremely low NOX emissions with increased engine efficiency. They produced hydrogen in a compact on-board generator from 45 gasoline and air. They cooled hydrogen-rich product gas and mixed with the normal combustion air in a modified carburettor. The engine was then operated in the conventional manner on atomized gasoline with spark ignition, but with hydrogen-enriched air and with a high spark advance of 40°-50° BTDC. Thus the engine received two charges of fuel: a charge of gaseous fuel from the hydrogen generator, and the normal gasoline charge. The results on hydrogen enrichment were compared with the 1973 V-8 baseline stock engine with emission controls and the same engine without controls and operated at maximum efficiency under lean conditions. Relative to the stock 1973 350 CID engine, an approximate 10% reduction in brake specific fuel consumption was measured over the entire level road load speed range. For the same condition, NOX emissions were reduced to below the equivalent 1977 EPA Standards. Rose (1995) made researches on the method and apparatus for enhancing combustion in an ICE through electrolysis and produced hydrogen along with oxygen yielded enhanced combustion at low engine loads for all types of engines.

III. CONCLUSION

In this paper we concluded by seeing the observation table that the use of HHO in gasoline engine enhance the combustion efficiency, consequently reducing the fuel consumption by 35% to 45%. The use of HHO in gasoline engine lead to reduction in emission of harmful pollution such as CO, unburnt and hydrocarbon. The use of HHO in gasoline increase the power output if engine around 5.7%. The HHO gas kit can be easily integrated with existing engine at low cost. So we conclude from the table that only with gasoline the engine runs for without hydrogen 9.0km but with the help of HHO 10.5km in 200ml fuel hence HHO is efficient fuel for engine.

IV. REFERENCES

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