Scientific Journal Impact Factor (SJIF) : 4.364
International Journal of Modern Trends in Engineering and Research
ISSN (ONLINE) : 2349 - 9745 ISSN (PRINT) : 2393 - 8161

EFFICIENCY IMPROVEMENT OF I.C. ENGINE BY USING HHO KIT: A REVIEW PAPER

Shadabkhan Pathan[1] ,Sanket Saundatte[2], Asif Shaikh[3], Sahir Shaikh[4], Gopal Vadar[5] and Prof.M.B.Tandale[6]

[1,2,3,4,5]U.G.Students

[6]Assistant Professor

Abstract- In the present days people living in the every part of society are facing basically two types of problems: i) hike in fuel prices ii) harmful emissions from automobiles. Since past few years automotive companies have been searching for a special device for the increment in thermal efficiency of the I.C engines and protecting the environment from pollutants [1]. As a result HHO kit has been introduced in the work which uses the brown gas (HHO) as a source of energy. Gas is produced by electrolysis process which contains a mixture of 2/3 of hydrogen and 1/3 of oxygen bonded together[2].Electrolysis process is carried out in HHO dry cell. In addition to that hybrid IC engine during operation simultaneously charges the battery using alternator. The proposed HHO device is compact and can be easily installed nearby engine. As hydrogen is an environment friendly gas so can be used as alternative fuel for internal combustion engine. This article gives a review of the effect of HHO gas addition on engine performance and emission characteristics.

Keywords- I.C.Engine, HHO, Hydrogen, Electrolysis.

I. INTRODUCTION

As we know that average efficiency of an IC engine is 20% to 30% rest of energy of the fuel goes waste through exhaust gases and incomplete combustion. So what is required is simple and inexpensive system which overcomes above problems and increases thermal efficiency of the engine. As an evolution the concept of hydro powered bikes is introduced. These are the bikes which use power of hydrogen as well as conventional fuel for driving the bike. Hydrogen gas kit is the latest innovation to increase the mileage and power of vehicle. HHO gas is odourless, colourless and lighter than air and highly flammable much more than gasoline [2].The Oxy hydrogen explosion is so fast that it fills the combustion chamber 3 times faster than gasoline results in increase in power developed. Addition to that hydrogen is clean gas which gives water vapour as an output product. Use of hydrogen not only helps to increase the efficiency but also reduces the pollution to greater extent. Use of hydrogen hence prevents depletion of precious natural resources through process of electrolysis of water in a sealed container. This generated HHO gas is then supplied to intake manifold of the engine.

II. WOR KING PRINCIPLE

The electrochemical process used for producing Brown gas is electrolysis. The electrical supply used for process is connected to the vehicle's battery. Power source is connected to the electrode materials (Steel) which are placed in water. Hydrogen will appear at the cathode and oxygen will appear at the anode material i.e. reduction at cathode and oxidation at anode takes place. The amount of hydrogen generated is twice the number of moles of oxygen and both are proportional to total electrical charge conducted by electrolyte solution which is generally sulphuric acid. The generated HHO gas is then supplied to the bubbler tank which will give the indication of generation of HHO gas. Then the proportional amount of HHO gas is then supplied to intake manifold of the engine. Whenever the vehicle is started, current is passed through electrolysis circuit and HHO starts producing.

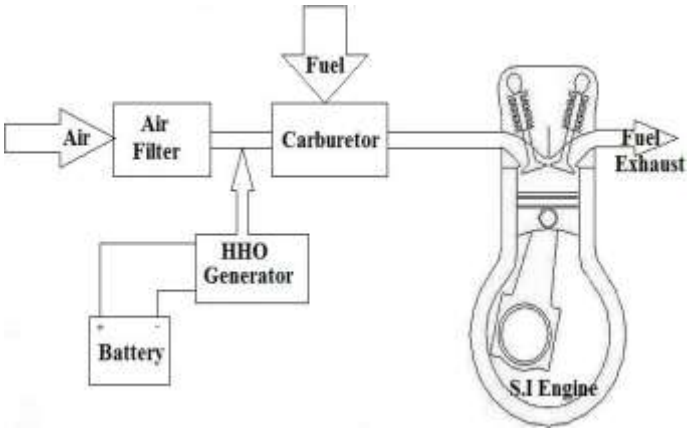

fig.(1) Working Principle

III. WORKING PROCESS

The hydrogen generated at cathode is fed to the inlet manifold that is in air hose pipe of the carburettor, then this gas mix with the coming air from the air filter when the vacuum is created by the piston movement from TDC to BDC. As the hydrogen or HO gas mixed with air then it goes to engine cylinder with gasoline during suction stroke of the engine. At the end of compression stroke the spark is generated from the cold rated spark plug the combustion of gasoline and HO gas occurs. HHO itself contains 1/3 oxygen by volume and 2/3 hydrogen (which has an octane rating of 130).The hydrogen explosion is so fast that it fills the combustion cylinder at least 3 times faster than the gasoline explosion and subsequent ignites the gasoline from all directions. Hence more power is generated consequently the mileage of our bike gets increased some basics the burn speed of hydrogen is 0.098 to 0.197 ft. /min (3 to 6 cm/min) compared gasoline´s 0.00656 to 0.0295 ft./min (0.2 to 0.9 cm/min)

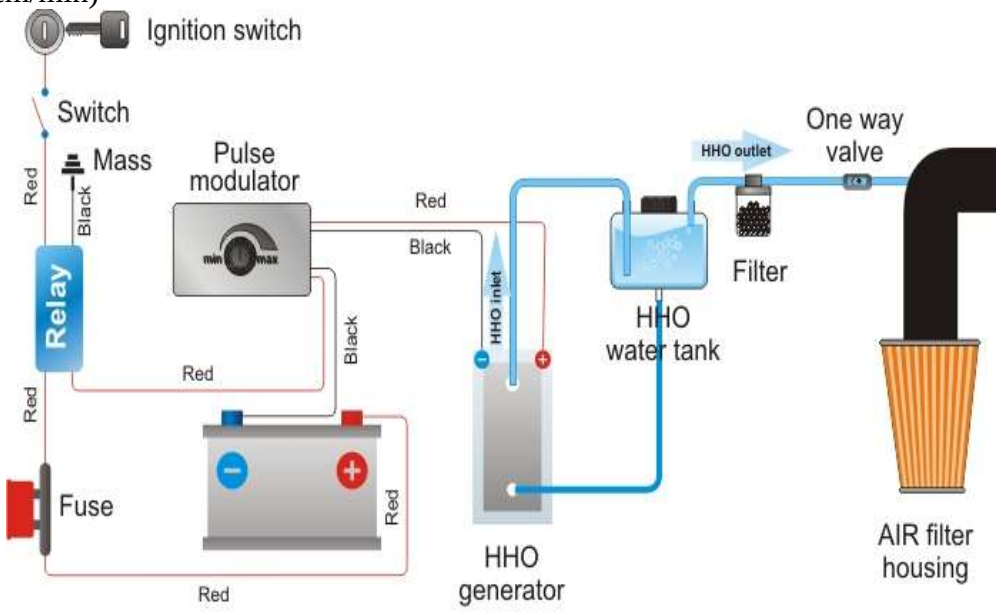

fig.(2) Working Process

IV. CONCLUSION

A very less study has been done on HHO as an alternative fuel. HHO generation rate and their exact properties with values are not explored much. But as per review of available research papers ,one of main advantage of HHO system is that HHO can be easily controlled with the help of voltage and current regulation and can be easily implemented with any engine test rig[2]. The use of HHO gas helps in increase in mileage, increase in brake power, reducing exhaust emission. Increase

in efficiency may vary from 20% to 30%[2].Due to its properties such as wide flammability range , high calorific value enables complete combustion of fuel under high and low speed conditions.

REFERENCE

[1] Harshal Vashi, G.T. Haldankar, Dr. Y.S. Rao " Reduction of fuel consumption in Engine using HHO gas". International Journal of Advance Research in science and engineering, Vol. No. 5, Special Issue No.(01),Feb. 2016.
[2] D.R. Gabhane, S.S.Deshmukh "Performance of Internal Combustion Engines". IJSRD Vol. 3,Issue 04,2015.