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Advancement and Experimental Analysis of SI Engine by using Electrolysis Process (H_2O)

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Abstract: ***The objective of this work was to construct a simple innovative HHO gas generation system and evaluate the effect of combustion with HHO addition, as an engine performance improver, into gasoline fuel on engine performance and emissions. HHO cell was designed, fabricated and optimized for maximum HHO gas productivity per input power. This project consists of a small electrolysis fuel cell, Non return valves, 12V Battery, Two stroke SI engine and carbon filter. The electrolysis fuel cell is used to generate HHO gas (electrolysis process) by using 12 volt battery. The carbon filter is used to absorb the water and dirt particles from HHO gas. And then these gases pass to the engine after the carburetor and control the gasoline charge.***
The results showed that the HHO gas maximum productivity of the cell was 18 L/h when using 2neutrals plates with 1 mm distance and 6 g/L of KOH. The results also showed 10% increment in the gasoline engine thermal efficiency, 34% reduction in fuel consumption, 18% reduction in CO, 14% reduction in HC and 15% reduction in NOx.
Keywords: Carbon filter, electrolysis fuel cell, HHO gas.

I. INTRODUCTION

A trending global concern, toward lowering fuel consumption and emissions of internal combustion engines, is motivating researchers to seek alternative solutions that would not require a dramatic modification in engines design. Among such solutions is using H2 as an alternative fuel to enhance engine efficiency and produce less pollution.
Now a day's hopes have again been raised about production and development in ''hydrogen economy'' sector because most of them agreed that hydrogen is best alternative fuel to replace the existing fossil fuels as hydrogen is having the clean burning characteristics. For an engine running only with hydrogen the exhaust gases doesn't contains carbon oxides, hydrocarbons, particles and lead compounds excluding the unburned hydrocarbons or the carbon oxides provided by oil burning inside the combustion chamber. The hydrogen gas is acting as a light gaseous fuel. It is having high heating value on mass basis, wide flammability that gives wide mixture range in air which permits extremely lean or rich mixtures to support combustion. It requires lower amount of energy to start ignition process which results in extremely high speed flames. Its energy released by combustion per unit mass of chemically correct mixture remains high. The combustion properties of hydrogen have much influence on its performance as an engine fuel. There are mainly two different ways available to introduce hydrogen in combustion chamber for burning process.

II. SCOPE OF STUDY

A. To increase the efficiency of gasoline engine with the addition of HHO gas.
B. To decreases fuel consumption and improve engine thermal efficiency increases.
C. To evaluate the effect of combustion with HHO addition, as an engine performance improver, into gasoline fuel on engine performance and emissions
D. To control the exhaust gas emissions.

III. CONSTRUCTION OF MODEL

This project consists of a small electrolysis fuel cell, Non return valves, safety valve, 12V Battery, Two stroke SI engine and carbon filter.

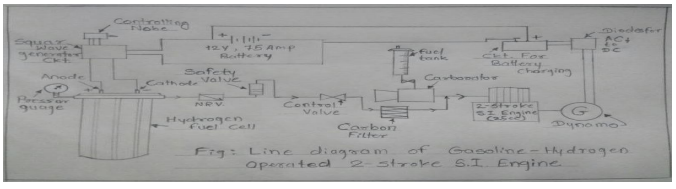

Fig :- Line diagram of Gasoline-Hydrogen operated 2-stroke SI engine

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The electrolysis fuel cell is used to generate HHO gas (electrolysis process) by using 12 volt battery. The carbon filter is used to absorb the water and dirt particles from HHO gas. And then these gases pass to the engine after the carburetor and control the gasoline charge. Above figure shows the line diagram of our project and the dynamo is use to charge the battery and diodes are use to convert the AC supply in DC.

IV. WORKING

Hydrogen fuel cell is use to generate the HHO gas. It consist of separation tank in which to two electrodes made up of stainless steel of battery one is anode and other is cathode are dipped in water and then 12 volt supply given to the terminal and electrolysis process get start which helps to generate the HHO gas.

Then this gas is passing through the non return valve and then carbon filter. In carbon filter moisture and dirt particles will absorb and then supply to the inlet of engine after the carburetor.
This supply of HHO gas at inlet of engine helps to improve combustion process and also control the exhaust gas emission.

V. RESULTS AND DISCUSSION

Sr no.	Substance	Quantity of fuel in ml	Speed in RPM	Time in second
1	Gasoline	10	300	150
2	Gasoline+HHO gas	10	300	200

A. First we take result on 2strock SI engine for 10ml gasoline at 300 RPM, its run for 150 seconds.
B. Than we take result for 10ml gasoline with HHO gas addition at 300 RPM then its run for 200 seconds.

VI. ADVANTAGES

A. Increase the efficiency of IS engine.
B. Consumption of fuel is less.
C. The results also showed 10% increment in the gasoline engine thermal efficiency, 34% reduction in fuel consumption, 18% reduction in CO, 14% reduction in HC and 15% reduction in NOx.
D. If hydrogen is used as supplementary fuel in SI engine then it results in improved engine performance.

VII. CONCLUSION

The efficiency of the engine is increase by using combine mixture of Hydrogen and oxygen gas insert into the inlet of SI engine. And also control the exhaust gasses.

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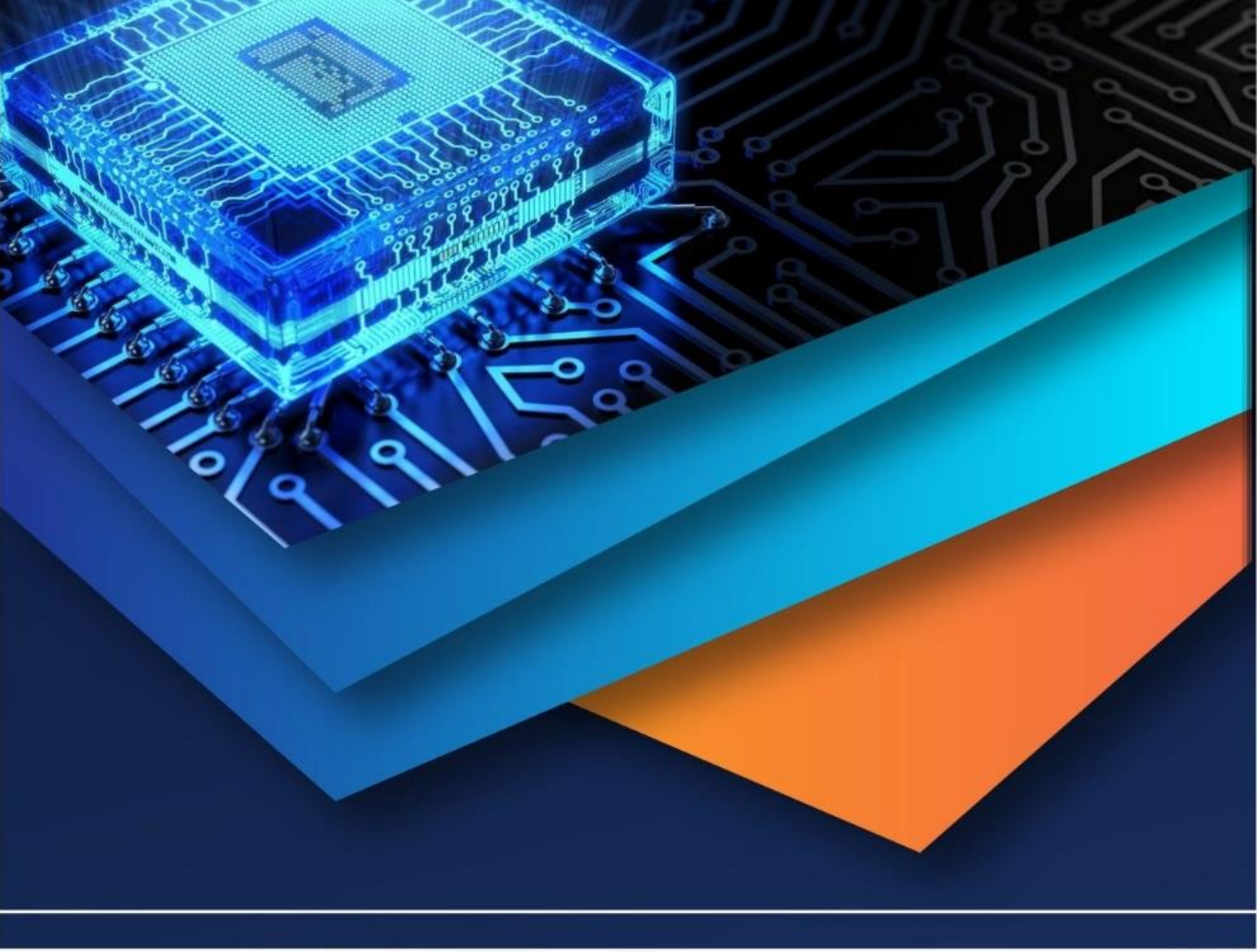

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