ISSN 2395-1621

Experimental Investigation on Effects of Magnetic Field on Hydrocarbon Fuels in I.C. Engine

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ABSTRACT

Now a days Global warming, Ozone Depletion are the serious issues. The air pollution causes such serious problems. Automobile sector is one of the biggest contributor for that. Fossil fuels source is limited source of energy. To use it carefully and efficiently, Magnetic field being a source of energy shows influence on various materials and fluids which respond to the magnetic field. Literature has been reported on energy of permanent magnets used for the treatment of vehicle fuel, to reduce fuel consumption, as well as reducing the emission of certain pollutants. Current article presents one of the attempts made for enhancing the efficiency of the petrol engine (two wheeler bikes). Here, an attachment is designed to accommodate the different magnets with different flux intensities. This attachment can be easily mounted on fuel lines of engine. Here, permanent magnets with different intensity (2000, 4000, 6000, 9000 Gauss) are installed on the fuel line of the two-stroke and four-stroke engine to study its impact on gasoline consumption, as well as exhaust gas emissions and compared with performance without application of magnetic field to estimate the performance improvement. Experimentation shows improvement in mileage of 2 wheeler bikes up to 10 – 12 % .

Keywords— Magnetic Field, Hydrocarbon Fuel, Magnetic Flux

ARTICLE INFO

Article History

Received :18th November 2015

Received in revised form :

19th November 2015

Accepted : 21st November , 2015

Published online :

22nd November 2015

I. INTRODUCTION

In recent years, there are so many efforts towards the improving power output and emission of internal combustion engines per fuel, so that the products of combustion exhausted from internal combustion (IC) engines environmental friendly, and also beneficial for cost. The use of diesel engines have been increase day by day, due to their high thermal efficiency and low pollutant formation characteristics but it has a serious drawback of having a comparative larger amount of emission which is larger than that of a gasoline engine. Magnetic field that ionized the fuel based on the principle of magnetic field mutual action with hydrocarbon molecules of fuel and oxygen molecules. There are various physical attraction forces between hydrocarbons and they form densely packed structures called pseudo compounds which can further organize into clusters.

During air/fuel mixing process due to the physical attraction forces between hydrocarbons, oxygen atoms cannot penetrate into their interior, these structures become stable. The external force of magnetic field helps to polarize the hydrocarbon fuel. This is because the outer spinningelectron absorbs the energy from the applied magnetic energy, and become unstable resulting weakening of the covalent bond between hydrogen. So that

hydrocarbon fuel changestheir orientation and increase space between hydrogen. This hydrogen of fuel actively interlocks with oxygen and producing a more complete burn in the combustion chamber[1,3].It has been noted that when the fuel passes through a
magnetic field, it helps increasing the atomization process by improvedmixture formation. Increase in the rate of disintegration of the droplets because of reduction in the surface tension and viscosity of the fuel.[1]

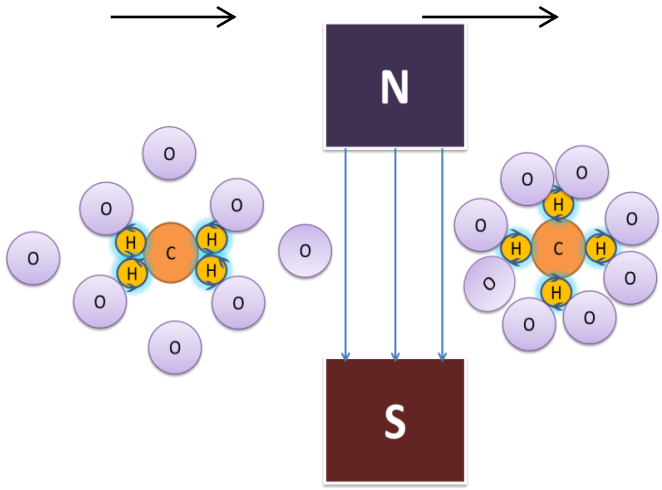

Fig.1 Conversion of Parahydrogen into Orthomagnet by passing through Magnetic Field

II. TYPES OF MAGNETS

A. Magnets

Magnet is an object that produces continuous magnetic field around it which is invisible but the effect of the magnetic field is notable. Magnets can attract all ferromagnetic materials such as iron and also can attract and repel with other magnet. There are many type of magnets in different range of dimension, shape and strength. The most typical magnet used in science laboratory is made up of ferrite and neodymium magnet.

1) Ferrite Magnets

Ferrite magnet is the compound of ceramic and Iron oxide. This is an example of permanent magnet and used as ferrite cores in the transformer. Generally, ferrite magnets are carbon black in color and brittle because the present of ceramic particle in the chemical compound. Ferrite magnets also considered as strong magnets but not as strong as neodymium magnets.

2) Neodymium Magnets

This magnet also known as Neo magnet which is most widely used type of rare earth magnet and in bright silver color. This is a permanent magnet which made from alloy of neodymium, iron and boron and this magnet considered to be the strongest magnet type among other permanent magnet. The magnetic strength measured in Gauss and permanent magnet has different strength at different region of the surface.

The strength of permanent magnets usually measured with ranges for an example; in the project we use neodymium magnets, around 3000 Gauss. The strength of magnets measured by an instrument called Gaussmeter or magnetometer.

Fig2. Neodymium Magnet Pair (3000 Gauss)

III. METHODOLOGY

By using permanent magnets of strength 3000 gauss we tested on some bikes for efficiency, fuel consumption and emission. The procedure for the reading or testing held as follows,

1. First we had taken some bikes with different cc and specifications.
2. Cut off the fuel supply line provided to bike and attach new long carburetor pipe with small temporary fuel reservoir. (Small bottle)
3. Now take some fixed amount (i.e. 50ml) of the fuel (petrol) in temporary reservoir i.e. bottle
4. Now before starting the reading or testing make sure that all fuel in carburetor is completely burned or carburetor is empty or dry.
5. Attach the external long carburetor fuel pipe with bottle in which the measured amount of the fuel is taken, and start the vehicle and continue to go.
6. In this process keep speed at constant level and constant gear. In this case speed 40 km/hr and run on 3rd gear. Also find the track on which bike to be run should be constant and even.
7. Because if track is uneven and application of brakes due to obstacles there may be error in the reading and May difficult to find out the effect and compare them.
8. Complete the run till the end of the fuel in bottle and till engine get switch off. Note the reading from speedometer.
9. After that, attach the 1 pair of magnet to the fuel line just before the carburetor and repeat the same procedure as done before from the same point from where 1st reading is started with zero reading and note down the reading after engine get switch off.
10. Repeat the same procedure by increasing the no of pairs of magnet to the fuel line and note down the readings to find improvement.
11. Procedure is same for the emission tension but at stand still position; as it is not possible to take reading at moving condition

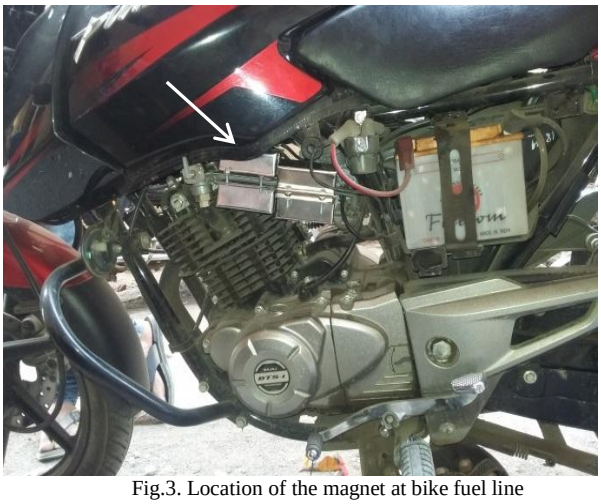

Fig.3. Location of the magnet at bike fuel line

TABLE 1.KM/LITR BY APPLYING MAGNETIC FIELD AND WITHOUT MAGNETIC FIELD

Model	No mag nets	1 pair of magnet	2 pairs of magnet	3 pairs of magnet	4 pairs of magnets
1	60	62.40	62.40	66.00	66.20
2	60.67	62.83	64.00	66.67	66.83
3	74	75	75.40	77.40	78.40

IV. RESULT

By plotting the tested bikes reading in graphical format we can conclude as following.

A. Improvement in engine performance

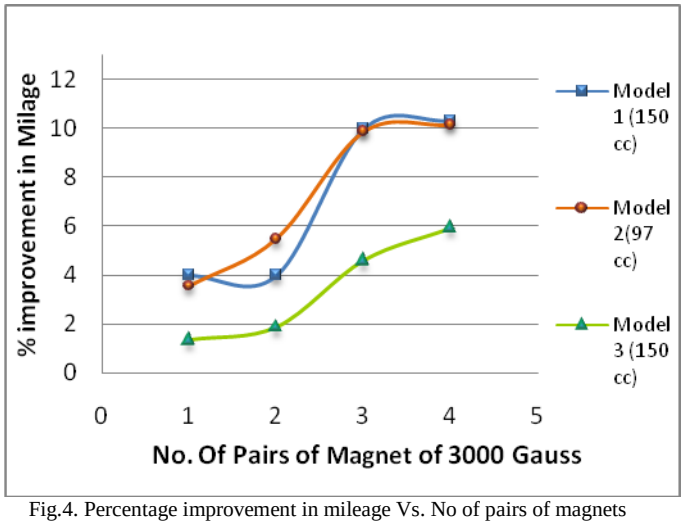

Fig.4. Percentage improvement in mileage Vs. No of pairs of magnets (gauss)

From Table.1 of readings and Fig.4 finds that improvement in the mileage of bikes by 10.33%, 10.16% and 5.94% of Models 1,2 and 3 respectively by applying 4 pairs i.e. 12000 gauss of magnets.

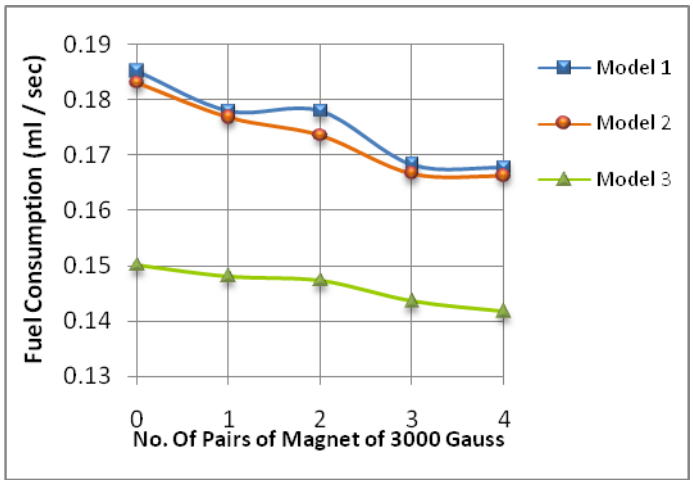

Fig.5. Rate of fuel Consumption Vs No. of pairs of magnets

Fig. 5 representing that the rate of fuel consumption decreasing as increasing no. of pairs of magnets that means as increase in field strength fuel consumption rate decreases. So, that increment in mileage as seen in previous graph.

Fuel consumption rate is decreased up to 9.36%, 9.22% and 5.61% by application of 4 pairs of magnets i.e. 12000 gauss magnetic field for Model 1, Model 2 and Model 3 respectively.

B. Emission testing:

As we apply the strong Magnetic field there is effect on emission also.

a) CO EMISSION

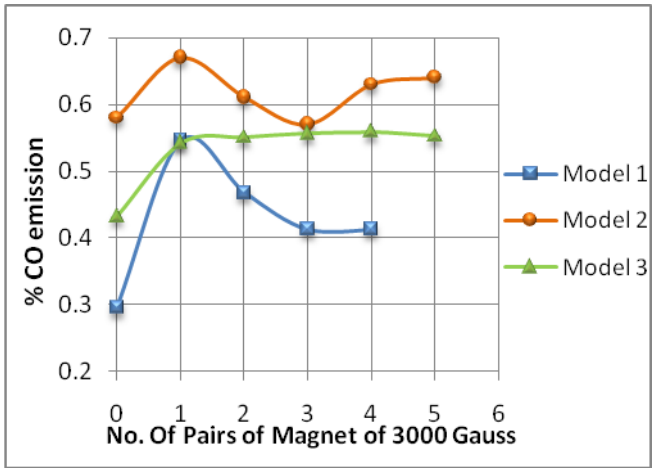

Fig. 6 CO emission Vs No. of Magnets pairs (Field Strength)

b) CO_2 EMISSION:

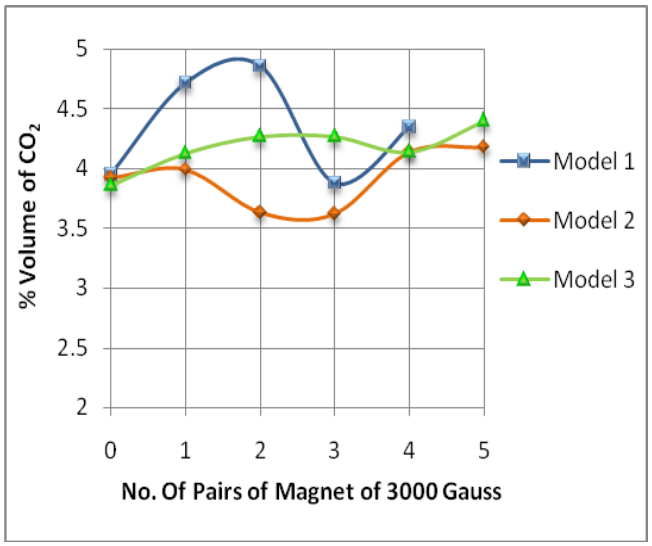

Fig 7. CO_2 Emission Vs. No. of pairs of Magnets

From Fig. 7 there is increase in the emission percentage of the CO_2. It means that there is improvement in complete combustion.

From graph we found that at certain pair or certain amount of magnetic field strength there is drop in the CO_2 emission. From this we can say that for specific engine requires specific amount of magnetic field strength for higher effect.

Increase in CO_2 emission is by 6.90%, 10.12% and 13.43% of Model 1, Model 2 and Model 3 respectively.

Testing on SI and CI test rig is going on. We will get the results on test rigs soon.

V. CONCLUSION

i. Due to application of magnetic field on fuel lines i.e. intake fuel lines due to de-clustering of hydrocarbons by weakening of the covalent bonds between hydrogen and carbons.
ii. This hydrogen of fuel actively interlocks with oxygen and producing a more complete burn in the combustion chamber.
iii. Improvement in the mileage of bikes by 10.33%, 10.16% and 5.94% of Models 1,2 and 3 respectively by applying 4 pairs i.e. 12000 gauss of magnets.
iv. Rate of fuel consumption is decreased by about 8-9 %
v. Also magnetic field effects on emission. Increase in CO_2 emission is by 6.90%, 10.12% and13.43% of Model 1, Model 2 and Model 3 respectively.

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