GASOLINE ENGINES INOCULATION

VINEET GUPTA[a1], BHASKAR PAUL[b] AND AKLESH RAUNIYAR[c]

[a]Department of Mechanical Engineering, DKNMU, Newai, Rajasthan, India
[b]Technical Advisor, Baruch Motors Pvt. Ltd., Assam, India
[c]Freelance CAD Designer, Soul, Korea

ABSTRACT

From the last long time, varying resources to empower gasoline engines are in ongoing process and one of many processes is to use hydrogen. For that very reason, investigation over air cooled four stroke spark ignition (SI) engine equipped with single cylinder is being performed with the help of an electrolytic generator and further examined the effects of HHO gas substitution with petrol for emission benefits. Introduced electrolytic generator works on electrolysis principle to split water into its two molecules of hydrogen and oxygen in gas form. This gas is introduced in the combustion chamber of engine to reduce the harmful emissive gases.

KEYWORDS: Electrolytic Generator, Spark Ignition Engine, Emission

Here, HHO booster is fitted over a four stroke petrol engine motorbike to reduce the harmful emission of combustion gases. Engines generally emit gases like CO and HC that pollutes the environment.

Carbon monoxide (CO) in the air is inhaled and binds to hemoglobin which leads to asphyxiation and affect normal functioning of different organs resulting in impaired concentration, slow reflexes and confusion (Raub, 1999; Kampa and Castanas, 2008; Walsh, 2011 and Strauss et al., 2004).

Hydrocarbon (HC) emissions have harmful effects on environment and human health and form the ozone whereas; contribution of vehicles only is about 50 % of the emissions of this type of ozone. Hydrocarbons are toxic and cause respiratory tract irritation and cancer (Diaz-Sanchez, 1997; Krzyzanowski et al. 2005).

HHO Generator

In this, electric current is used to split water molecules into hydrogen and oxygen. The electricity enters the water at the cathode (negatively charged electrode) and leaves through anode (positively charged electrode). Then, hydrogen is collected at the cathode and oxygen is collected at the anode. Both these gases mix are get mixed and the combined gas is become HHO. They had reviewed various papers and concluded that to improve the efficiency of C. I. engines, enriched hydrogen-HHO gas be used as secondary fuel. (Reddy et al., 2014).

Morichauhan et al. (2015) had investigated that Mechanical efficiency including Brake thermal efficiency, indicated thermal efficiency of the engine had increased while operated on HHO gas was more as compared with pure diesel. On the other hand, total fuel consumption of the engine was also increased but positive part was that emissions like carbon monoxide, hydrocarbon, carbon dioxide and NOx were greatly reduced. Strauss et al. (2004) had analyzed the Carbon monoxide emissions from marine outboard engines. Raub (1999); Kampa and Castanas (2008) had analyzed the health effects of exposure air pollution and ambient carbon monoxide in particular. Diaz-Sanchez (1997) had analyzed the role of diesel exhaust particles and their associated polyaromatic hydrocarbons in the induction of allergic airway disease. Krzyzanowski et al. (2005) had analyzed the health effects of transport related air pollution.

PROBLEM FORMULATION

In India, enormous increase in the number of vehicles has started massive pollution and its numerous side effects on human health and overall environment. Great need is arise to use alternative fuels for the IC engines over increased emission problems of gasoline and diesel engines to bring down air pollution due to vehicles.

RESEARCH OBJECTIVE

To reduce the petrol engine emission

Methodology

Booster used to control the pollutants from emission gases of the motorbike; have specifications mentioned in the below table l:

[1]**Corresponding author**

Table 1: Specifications of Booster

Brand	Hydro Tech
Item Weight	399 g
Product Dimensions	18 x 13 x 9 cm
Code	HT150
Operating Life	20000 Hours
HHO Kit	HHO Generator, Filling Syringe (to fill electrolyte), Connection Pipe (to connect booster pipe to the carburetor pipe, Electrolyte (1 tablet of KOH), Power Controller, Clip, Nut and Bolt (to hold booster)
Weight	399 Grams
Amperage	5 milliamps
Voltage	12 Volts
Wattage	25 Mill watts

Specifications of the motorbike under study over which HHO booster was fitted; are mentioned in the table 2:

Table 2: Motor Bike Specification

Model	Hero Honda Glamour
Year	2010
Category	Sport
Displacement	124.50 cc
Engine type	Single cylinder four-stroke petrol engine
Power	9.00 HP @ 7000 R.P.M.
Torque	10.35 Nm @ 4000 R.P.M.
Compression	9.1:1
Cooling system	Air
Gearbox	4-speed
Clutch	Wet multi-plate
Front suspension:	Telescopic Hydraulic Fork
Rear suspension	Swing Arm with Hydraulic Shock Absorbers
Front and Rear brakes	Expanding brake (drum brake)
Overall Weight	129.0 kg
Overall length	2,005 mm
Overall width	735 mm
Fuel capacity	13.60 liters
Color	Blue
Starter	Electric

Fitment of the Booster in Motorbike

Earlier specified HHO Booster was fitted in the motor bike under study with the help of clip holder near engine in front of Telescopic hydraulic shock absorbers which is clearly visible in figure 1.

Figure 1: Bike under study with HHO Booster

Major activities those were carried out during fitting of booster as well as to make it operational; are briefed below:

- Opened the Booster Cap and filled with 150 ML of distilled water along with very small amount of electrolyte (one tablet of KOH), then tightened the cap.
- Fitted the Booster in the bike frame with the help of a clip holder near engine in front of telescopic hydraulic shock absorbers by keeping straight position of Booster in 90 degree.

- Connected one black wire with the earth wiring in the bike and another red wire with the ignition switch of the bike.
- Connected the booster blue pipe with the carburetor inlet pipe.
- Switched ON the bike and start to run.

Line diagram of circuit of booster accessories is given by figure 2.

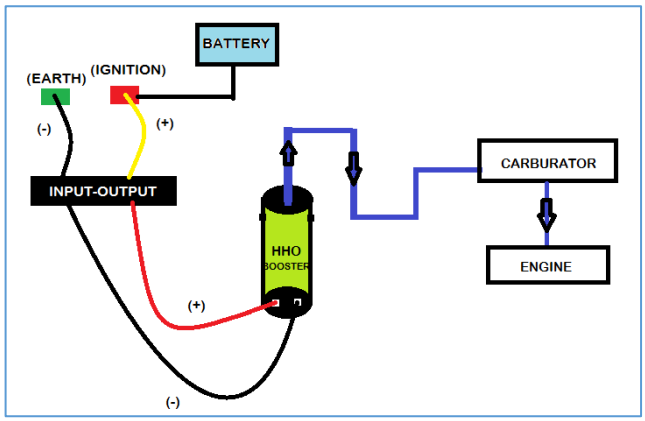

Figure 2: Installing HHO booster

Emission Check of Bike

Emission gases tested for consecutive four days under standard operating conditions before and after installing the booster and given in the table 3.

Table 3: Standard Conditions set before testing of Bike

Standard Conditions	Parameter
Front wheel air pressure	25 PSI
Rear wheel air pressure	40 PSI
Ambient temperature at the time of study	30°C
Distance covered before conducted the pollution test	71 Km

Observations of pollution test before and after installing booster is given in tables 4 and 5.

Table 4: Pollution test observations without Booster

Observations	Day 1	Day 2	Day 3	Day 4
CO(Carbon Monoxide)	**3.8**	**3.8**	**3.7**	**3.7**
HC(Hydro Carbon)	**4500**	**4600**	**4600**	**4600**

Table 5: Pollution test observations with Booster

Observations	Day 1	Day 2	Day 3	Day 4
CO(Carbon Monoxide)	**3.5**	**3.4**	**3.4**	**3.4**
HC(Hydro Carbon)	**4500**	**4500**	**4500**	**4500**

RESULTS AND DISCUSSION

After observing four days emissions gases behavior, specifically of CO and HC before and after commissioning of HHO Booster in motor bike under study; outcome is encouraging as CO were felt reduced by 8.1% to 10.5% and HC were reduced by 2.17%.

CONCLUSION

HHO gas technology is at experimental stage for majority of automobile manufacturers with tremendous benefits. It is an auxiliary fuel to reduce emissions with an inaudible and cleaner engine operation. It is a good option to save the environment must be practiced.

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