

FABRICATION of HYBRID VEHICLE

A.H. Ingle¹, Giten Bagde², Sandip Patode³, Chetan Ingole⁴

1. *Associated professor, Department of Mechanical Engineering, SRPCE, Nagpur,*

Email: anil_ingle943@rediffmail.com

2. *UG Student, Department of Mechanical Engineering, SRPCE, Nagpur,*

Email: gitenbagde1000@gmail.com

3. *UG Student, Department of Mechanical Engineering, SRPCE, Nagpur,*

Email: sandippatode96@gmail.com

4. *UG Student, Department of Mechanical Engineering, SRPCE, Nagpur,*

Email: chetaningole1994@gmail.com

found in its molecular form, ex. H₂O. The HHO gas helps

Abstract:

An increasing price of fossil fuel and increasing in the pollution therefore world is shifting towards the non polluting fuels which are easy to get and low in cost. In this project we have fabricated a three wheeler which is driven by the Hybrid Engine. In this Hybrid Engine, we are using the HHO (Hydrogen Hydrogen Oxygen) gas as an additive with Petrol. Three wheeler Vehicles are very useful physically disabled persons and it is also use for transportation. The three wheeler vehicles are used for public transport and material loading. In this project our aim is to increase the efficiency of existing engine, existing engine means the engine of an old bikes and scooter which are not giving sufficient mileage and power. The KOH catalyst is added into water to diminish hydrogen and oxygen bonds. The engine torque output increased by 15%, emission of CO reduced by an average of 13%, HC emission reduce by with an average of 5%.

Keywords - SI engine, brown gas, HHO generator, electrolysis, etc.

I. INTRODUCTION

In a current scenario, people are attracting towards the new thing. When the people saw something new and innovative then they just move toward the new thing. And put the old one in the store or sold it. Such type of situation is also in the automobile industry. Every week company introduced new vehicle. The automobile engines now a day are very efficient as compared to the engines before 5-10 years. So our project to select such engine and increase the efficiency of that. By the use of Hydrogen- Hydrogen-Oxygen (HHO) gas as an additive fuel with petrol we can increase the efficiency of engine. It doesn't mean that we can't use the HHO in a new engine. As we know that the automobile exhaust gases are one of the reasons for today's polluted world. And here another property of Hydrogen introduce that it is a nonpolluting fuel. By the burning of hydrogen on polluting gas id exhaust. In this Hybrid tricycle we use the engine of kinetic Honda 4S scooter. The engine is 4 stroke single cylinder engine. In it the HHO gas is an additive fuel with petrol. Hydrogen is colourless, odourless and non-toxic. Hydrogen is mostly

the percentage of unburned gas in the exhaust is reduced. And this unburned gases is one of the reason of low efficiency so if the unburned gas is reduced the efficiency of engine will increased. For the motor the HHO gas will be delivered by the HHO generator. An effective framework should deliver an extensive volume of hydrogen gas utilizing an almost no power, in this way such a framework will have the capacity to expanded the energy of a start motor while decreasing the air contamination. Hydrogen is clean fuel which on combustion produces water vapour as the only product.

II. WORKING PRINCIPAL OF HHO

This idea take a shot at the important of electrolysis process, the electrolysis is a procedure that believers water to gas. Hydrogen will show up of the cathode (the contrarily charged terminal when electrons enter the water). As per perfect

faradic effectiveness the measure of hydrogen is produced is double the quantity of moles of oxygen and both are relative to the aggregate electrical charges led by the terminals arrangement.

The hydrogen generated from cathode is fed to the inlet manifold is in air hose pipe of the carburetor then this gas mix with the coming air from the air filter when the vacuum is created by piston movement from top death centre to bottom death centre as the hydrogen or HHO gas occurs HHO itself contains 43 oxygen by volume and 2/3 hydrogen (which had an octane rating 130).

Blast of hydrogen is speedier that it fills the burning of barrel of slightest 3 times and furthermore then the fuel blast and subsequence touches off the gas from all bearings. Thus move control are produced therefore and the mileage of our bicycle get expanded and the essential consume speed of hydrogen is 0.098 to 0.197 ft/min (3 to 6 cm/min) contrasted fuel's 0.00656 with .0295 ft/min (0.2 to 0.9 cm/min).

PROPERTIES OF HHO GAS

- 1) It is odourless, colourless and lighter gas.
- 2) In the creation of HHO gas, there is no dissipation procedure at all the electric vitality utilized being deficient for vanishing.
- 3) PVT law does not followed by HHO gas .
- 4) HHO has wide range of availability.
- 5) HHO has low freezing point.

III. FRAME DESIGN



Design:

The frame is designed for the rear mounted engine. The frame is such that it has the wheel base of --- inches and track width is – inches.

Material:

Simple mild steel is used for the fabrication of the chassis. Mild steel contain 0.05- 0.25% of carbon. It is strong, tough and cheap. The 1.25” diameter tube with a thicker wall is used.

IV. TECHNICAL SPECIFICATION

Dimension:

Track width-855 mm.

Wheel base-1270 mm.

Ground clearance-175 mm.

Transmission system:

Transmission– CVT & chain drive

Chain no.- 40 (08B-1)

Driver sprocket- 15 teeth

Driven sprocket- 42 teeth

Weight of the vehicle:

without driver-80 kg.

Breaking system:

Brake- liner brake/ brake shoe type

Tires:

Rear tire- 2.75-18

Front tire- 2.25-16

Suspension system:

Stiffness- 16 N/mm

Leangth- 345.55 mm

Material- chrome vanadium alloy steel

$$F_{TR}=F_R+F_F= 17.65 \text{ N.}$$

Climbing resistance

$$F_{CR}=m \times g \times \sin \Theta$$

$$\Theta = 13$$

$$F_{CR}= 397.02 \text{ N.}$$

V. ENGINE SPECIFICATION

Engine- kinetic Honda 4S

Engine displacement- 113.10 cc

Engine type- 4 Stroke, air cooled, single cylinder

Borex stroke- 50mm×57.8mm

Maximum torque- 7.7 Nm @ 5000 rpm

Top speed- 60 kmph

Total force

$$F_T = F_{TR} + F_{CR} + F_D + F_i$$

$$F_T = 522 \text{ N.}$$

Speed ratio

$$T_2/T_1 = 2.8$$

CALCULATION

Force to start:

$$F = m \times a$$

$$F = 180 \times 2.7$$

$$F = 486 \text{ N}$$

Drag Force:

$$F_D = (\rho u^2 C_D A) / 2$$

$$F_D = (1.1 \times 13.88^2 \times 0.3 \times 0.2516) / 2$$

$$F_D = 8 \text{ N.}$$

Friction force

$$F_{rear} = 0.7 \times 176508 = 1236.06 \text{ N.}$$

$$F_{front} = 0.3 \times 176508 = 529.74 \text{ N.}$$

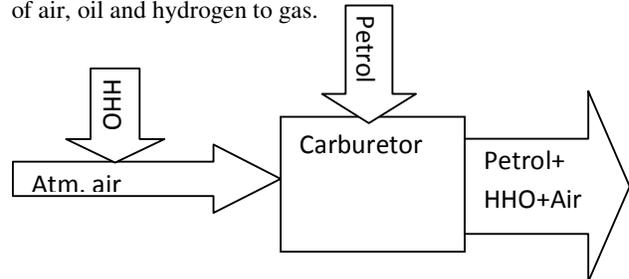
Rolling friction

$$F_R = 0.01 \times 1236.06 = 12.36 \text{ N.}$$

$$F_F = 0.01 \times 529.74 = 5.297 \text{ N.}$$

Carburetor Setting

Atmospheric air from the atmosphere comes in carburetor & HHO gas is enters inside the carburetor via outlet pipe of HHO generator. When all is said in done the carburetor makes a blend of air and oil however in here it influences the blend of air, oil and hydrogen to gas.



HHO gas in engine

HHO gas in motor Here in ignition chamber the oil blended with the blend of air and HHO gas that goes into the burning chamber from HHO generator. Because of this blend of hydrogen gas with air the nature of fuel increments. Because of this blend of hydrogen gas with air it gives successful consuming of fuel since hydrogen gas is profoundly combustible. The fire speed of hydrogen is high expansion Of H2 gives burning in lean frame.

Safety consideration of HHO

1. The HHO is termed as HHO on Demand because when the engine is in start condition only then this gas is produce, it means the electrolysis process of water is only started by our vehicle engine is start condition.

2. HHO gas can never be stored. The moment it is produced when the engine in operation it is directly transfer to the engine intake process, this avoids harmful accession.

3. To protect the generator from getting to hot because use of high amp a fuse is used.

4. A fuse helps to avoid wires from burning and it also reduce the electric shocks. In this way between electrolysis generator and power source a breaker is introduced.

5. When an HHO for flashback protection alone never awaits then it is consider as a good HHO safety.

RESULE

Engine:

Sr. no.	Fuel consumed	Fuel consumed (sec) petrol only	fuel consumed(sec) petrol+ HHO
1	10 ml	54	61
2	10 ml	57	70
3	10 ml	60	68
		Avg=57	Avg=66.33

Vehicle

- Top speed of Vehicle is increased.

CONCLUSION:

- The HHO gas is taken for experimental but it is secondary fuel, which could help in reduce the emission of SI engine. Hear one experiment is conducted to know the emission of a diesel engine.
- The specific fuel consumption was reduce by about 20-30% when running with HHO since lower heating value of HHO is very high relative to that gasoline.
- As the lubrication oil passed into combustion chamber, some very little emission were observed when running with HHO.
- The engine efficiency was increased by about 10-30% when running with the HHO.

REFERENCES

1. Pranay N. Patel, Mr. Hitesh K. Solanki and Mrs. Vandana Y. Gajjar, "Experimental Investigation Of Hydrogen Port Fuel As A Part Of Suppliment On 4-Stroke Si Engine," *IJSRD - International Journal for Scientific Research & Development* Vol. 2, Issue 03, 2014 \ ISSN (online): 2321-0613
2. Shrikant gunjal, Dinesh R. satpute, Gaurav Dinkar Sonawane , " Design, Analysis & Fabrication of efficycle: A Hybrid Tricycle ," *IJETT- volume17 Number8-Nov2014*
3. P.P. Dutta , S Sharma , a mahanta, s gupta, a. choudhury, k. barman, d. barua, r. gogoi, a.das, "Development of an efficient hybrid tricycle," *AIMTDR 2014 December 12th - 14th, 2014, IIT*
4. C. Naresh, Y. Sureshbabu & S. Bhargavi Devi, "Performance and exhaust gas analysis of a single cylinder diesel engine using HHO gas (brown's gas)," *International journal of engineering research volume no. 3 issue no: Special 1, pp: 40-47*
5. A. Vamshi Krishna reddy, T. sharath kumar, D.K. tharun kumar, B. Dinesh, Y. V. S. Saisantosh, "Improving the efficiency of I. C. engine using secondary fuel," *IJTEER, vol 2, ISSUE 6 ISSN 2347-4289*
6. TS De Silva, L Senevirathne and TD Warnasooriya, "HHO Generator – An Approach to Increase Fuel Efficiency in Spark Ignition Engines," *European Journal of Advances in Engineering and Technology, 2015, 2(4): 1-7.*
7. Aaditya, abhishek, ajay,vipin, deepak "hydrogen powered petrol engine(hho engine)," *international journal of scientific & engineering research, volume 6, issue 5, may-2015.*
8. Abhay tiwari, Ishan jaswal, Sulipt das and anshu singh, "Design of efficycle- human powered light weight hybrid tricycle with inbuilt rear wheel steering and use of universal joint in front axle," *Research article OMICS international ISSN: 2167-7670*

