Research Paper

EXPERIMENTAL STUDY MAESTRO 110CC PETROL ENGINE BIKE

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ABSTRACT

In today’s scientific world, engineering has given us an enormous necessary device, which changes the way of lifestyle of human-beings. But in a way to preserve fossil fuel for future we have to innovate a kind of alternative or supplement fuel which is enough capable to reduce fuel consumption and pollution.

Now we all know that during combustion of hydrogen fuel large amount of pollutants emits like CO₂, NO, CO because of incomplete combustion, so our foremost aim belongs this project is to use recently introduced HHO or oxy hydrogen gas as a supplement of conventional fuel in two-stroke engine. And as alternate, we are going to use HHO or brown gas kit which is produced by electrolysis process of water. The HHO kit is easy to install in engine compartment and it was integrated and tested on gasoline engine of (110CC) HERO MAESTRO. Belt rope dynamometer, mounting frames and experiment setup were designed and fabricated. Performance and emission analysis has been done by using petrol and petrol HHO separately on engine. It was found that 25%-30% of fuel consumption was reduced with use of petrol having HHO and appreciable amount of decrement in pollutant emission such as CO, CO₂.

Keywords: four-stroke petrol engine of (110cc) hero maestro, electrolysis, oxygen enriched hydrogen gas HHO, emission characteristics, performance characteristics.

Introduction

As time is passing second by second and fossil fuel level is getting low every day, gallon of fuel is burned by vehicle and our nature sacrifices it to full-fill human needs gradual decrement in fossil fuel is becoming a great concern.

Almost all energy supplied to the world is b’coz of fossil fuels. Fossil fuel burns and emits waste, fuel gases, dust, ashes and clinker. And these exhausted elements have hazardous effect on mother earth.(1)

Another problem with fossil fuel is emission of pollutant, like CO₂, NOX, CO. in order to decrease these pollution, alternative fuels are being considered such as hydrogen oxygen mixture. Normally what we found that the pollution kickoff cause of waste or incomplete combustion that is not supported by our environment that interrupts our basic natural cycles such as oxygen cycle and carbon cycle.

Not only does the continued use of large amounts of fossil fuels poses a serious threat to the environment, but also in limited amount. These are debates amongst scholars related to the plucked amount of fuels. At the starting of 21th century most half of fossil fuels had already been exhausted. The known worldwide reserves of petroleum are 1000 billion barrels
are these petroleum reserves are predicted to be exhausted in 40 years (2)

Need for this paper arises because of shortage of crude-oil resources for satisfying our needs and papers catches attention to develop an system which can serve as a basis of driving wheels (3)

In order to check emission control devices are incorporate by many countries in vehicle as a result reduced vehicle reduced mileage is extended by 15%. Without introduction of new technology (4)

In the paper we finally present, the first time, measurements on mixtures of hydrogen and oxygen called HHO gas generated via electrolyze (international patents pending by hydrogen technologies applications, inc. of Clearwater Florida), which mixture is distinctly different than the brown and other known gases. The parameters here in suggest the presence in HHO Gas of stable clusters composed of H and O atoms, their dimmers H-O, and there molecule H2, O2 and H2O whose bond cannot entirely be of valence type.(5)

This work presents an investigation to effect of hydrogen boost on exhaust gases emission of an internal combustion engine. The hydrogen booster generates hydrogen and oxygen using six water fuel cells and water droplets from the bubbler, these gases are then injected into intake system of engine. This water fuel cells are provided with electrical power from the dynamo of the engine. It’s found that the fuel consumption decreases and the value of the octane no. of gasoline also increases (6)

The goal of this work is to search out constituent of exhaust gases from I.C. engine when petrol is used. This paper inspire to find out the fuel that produce minimum pollution when used in the same auto-vehicle, thereby finding eco-friendlier fuel (7)

Hydrogen has been identified as a fuel having some unique and desirable traits for application in versatile I.C engines, it has been used as alternative fuel several time, though chiefly intended to be used secondary to a shortage of fossil fuels. Hydrogen has clean burning properties. When it burns, combustion does not produce byproducts except water and in the era when the global warming is serious problem it’s not less than a boom for future generation. The main advantage of hydrogen combustion is that greenhouse gases (CFC’s) not produce.

Evaluated the effect of adding steady quantity of hydrogen to the petrol-air mixture for S.I engine. As a result that addition of hydrogen helped brake specific fuel consumption of petrol decreased about 11.5%, while the thermal efficiency and the air/fuel ratio increases (8)

Investigated effect of hydrogen addition on combustion and emissions traits of hybrid hydrogen-gasoline engine (HHGE) at lean burn limit s and starting conditions. All these studies were carried out on a 4-cylinder 1.6 L engine, which was modified to realize hydrogen port injection by installing four hydrogen injectors in the intake manifolds. At lean conditions, brake mean effective pressure (BMEP) decreased with increasing of hydrogen addition fraction when the excess air ratio was around stoichiometric conditions. However, when the engine ran under lean conditions, the addition of hydrogen helped improve BMEP. The peak brake thermal efficiency increased from 26.37% for the original gasoline engine to 31.56% for the hydrogen enriched gasoline engine at 6% hydrogen addition fraction. The CO emission increased when the excess air ratio was around stoichiometric. But decreased under lean condition with the addition of hydrogen (9)

The addition of hydrogen benefited for engine operating at lean conditions. The excess air ratio (λ) at the lean burn limit was extended from 1.45 of the original one to 2.55 of the hydrogen volume fraction of 4.5%. HC, CO and NOX, emission at complete burn limiter obviously reduced for the HHGE (10)

Used a port fuel injector to supply a small amount of hydrogen in to the intake manifold to create a reactive homogeneous background for the direct injection of gasoline
in the cylinder. At lower load, the short spark delay allowed by H2 addition alone was not enough to compensate the higher NOX production, whereas the higher load, the large spark delay allowed by H2 enrichment was able alone to limit considerably NOx the indicated efficiency increased with H2 addition; in all conditions, HC emission was substantially lowered by hydrogen addition (11)

Also studied the effect of spark timing on the performance of HHGE at lean conditions. The result showed that IMEP and the engine indicated thermal efficiency first increased and then decreased with the increase of the spark advance. The spark timing didn’t have much influence on the information of CO emission, whereas HC and NOX emission were reduced with decrease of the spark advance. (12)

And finally at the end we have so many evidences expert statement which pointing toward HHO and clarifying that it’s one of the best supplement fuel which can work with gasoline SI engine that also reduced pollution and raises the efficiency of vehicle in all possible direction and make vehicle enough eco-friendly.

TECHNICAL SPECIFICATIONS

Engine
Type - Air cooled, 4 - stroke single cylinder OHC, Self Start
Displacement - 109 cc
Max. Power - 6.0 kW ( 8.2 Ps ) @ 7500 rpm
Max. Torque - 9.10 N m @ 5500 rpm
Ignition - CDI System

Transmission & Frame
Clutch - Dry, Automatic Centrifugal Clutch with variomatic drive
Chassis Type - High Rigidity Under bone Type

Suspension
Front - Bottom Link with spring loaded hydraulic dampers
Rear - Unit Swing with spring loaded hydraulic dampers

Hydrogen allows the fuel to burn more efficiently reducing the amount of waste (emissions). This also adds a bit more power to the engine, which increases its efficiency and improves your kms per liter.
Front Brake Drum; Internal expanding shoe type (130 mm) (CBS)
Rear Brake Drum; Internal expanding shoe type (130 mm) (CBS)

Wheels & Tyres

Tyre Size Front 90 / 100 x 10 - 53 J (Tube with Puncture Endurance)
Tyre Size Rear 90 / 100 x 10 - 53 J (Tube with Puncture Endurance)

Electricals

<table>
<thead>
<tr>
<th></th>
<th>CO by vol %</th>
<th>HC (PPM)</th>
<th>CO₂ by vol %</th>
<th>Throttle Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol</td>
<td>1.72</td>
<td>183</td>
<td>2.04</td>
<td>1</td>
</tr>
<tr>
<td>Petrol+HHO</td>
<td>1.66</td>
<td>169</td>
<td>1.86</td>
<td>1</td>
</tr>
<tr>
<td>Petrol</td>
<td>1.90</td>
<td>78</td>
<td>4.88</td>
<td>2</td>
</tr>
<tr>
<td>Petrol+HHO</td>
<td>1.61</td>
<td>41</td>
<td>4.18</td>
<td>2</td>
</tr>
</tbody>
</table>

Battery - 12 V - 3 Ah, MF Battery
Head Lamp - 12V - 35W / 35W - Halogen Bulb (Multi- Reflector MFR)
Tail/Stop Lamp - 12V - 5W / 21 W (Multi- Reflector)
Turn Signal Lamp - 12V- 10W (Amber Bulb) x 4 nos. (Multi-Reflector - Clear Lens)

Dimensions

Wheelbase 1240 mm
Ground Clearance 155 mm
Fuel Tank Capacity 5.3 litre (Min)
Kerb Weight 110 Kg

We conducted emission analyzing on petrol-HHO engine with the help of exhaust analyzer by supplying petrol and petrol + HHO fuels respectively. Result from this emission test shows that an appreciable amount of pollutants are reduced by using HHO gas as a supplemental fuel with petrol. The analysis is carried out on sagar hero servicing center, Madhya Pradesh. The reading and graphs are shown below in the table and figure.
Observation of petrol+HHO engine

We conducted performance analysis on Petrol-HHO engine by supplying petrol and petrol + HHO fuel respectively. After analysis it has been found that the specific fuel consumption, brake power and the thermal efficiencies are increased with the petrol + HHO fuel. The reading and graphs are shown in table and figure above.
CONCLUSION

After the performance and emission analysis result are compared and great variation is found in the use both kind of fuels. So, the following conclusions are as follows:

1. Reduce your fuel hero maestro up to 30%. This is valid for both highway and town (city) driving conditions.
2. Increases the power and performance in your car. The more fuel you burn, the more the engine gets rattled up and wrecked. Once you switch to supplemental hydrogen, it will enhance power and performance in your car.
3. Reduces the CO2 emissions. Eliminating pollution and other harmful residues that our car engines produce. What’s wrong with doing also something good for the environment besides saving money?
4. Reduces the temperature in the engine. Also improves engine life-span since its burning fuel at a much cooler state.
5. Removes the carbon residues inside your engine and prevent future carbon deposits.
6. Lower noise and vibrations in the engine. Hydrogen effect in the combustion cycle. The engine will sound much quieter than it was before. This is due to higher combustion efficiency in your car.
7. Increases the life span of your engine.

References

10. Ji changwei, wang shuofeng, “experimental study on combustion and emission performance of a hybrid hydrogen gasoline engine at lean burn


