Performance Analysis on 4-S Si Engine Fueled With HHO Gas and LPG Enriched Gasoline

B.Ramanjaneyulu[a], S. Lakshmi Narayana Reddy[b], G. Narasa Raju[a], R. Vidya Sagar Raju[a]
[a]Dept. of Mechanical Engineering, B.V.C. Engineering College, Odalarevu, E.G. District, A.P., India.
[b]Dept. of Mechanical Engineering, JNTU College of Engineering, Anantapur, A.P., India.

Abstract

An attempt has been made in this project to use alternative fuel in four stroke Gasoline engine. Our fore most aim in selecting this project is to use non-conventional fuel against conventional fuel which is becoming scarce and costly now days. The combustion of a hydrocarbon fuel with air produces mainly carbon dioxide (CO_2) and Water (H_2O). However, internal combustion engines are not perfectly efficient, so some of the fuel is not burned, which results in the presence of hydrocarbons (HC) other organic compounds, carbon monoxide (CO) and forming mainly nitric oxide (NO).

Keywords: *Petrol engine; Electrolysis; Oxygen Enriched hydrogen-HHO gas; emission characteristics*

1. Introduction

In this paper we present, apparently for the first time, various measurements on a mixture of hydrogen and oxygen called HHO gas produced via a new electrolyzer (international patents pending by Hydrogen Technologies Applications, Inc. of Clearwater Florida), which mixture is distinctly different than the Brown and other known gases. The measurements herein reported suggest the existence in the HHO gas of stable clusters composed of H and O atoms, their dimers H–O, and their molecules H2 , O2 and H2 O whose bond cannot entirely be of valence type [1].Need for this paper arises because of the scarcity of the crude-oil resources in our mother nature for satisfying our multiplying demands. This paper draws the prime attention of the authors to develop an alternative mechanism, which can serve as a basis for driving the automobile [2].In order to reduce the atmospheric pollution emitted by automobiles, control devices are being incorporated in the vehicles in many countries. This has resulted in a reduced vehicle mileage to the extent of about fifteen percent. With- out the introduction of new technology, any further reduction in emission levels would be expected to extract payment in the form of further fuel economy losses [3].This work presents an investigation to the effect of Hydrogen Booster System on exhaust gases emissions of an internal combustion engine. The hydrogen booster produces hydrogen and oxygen using six water fuel cells and water droplets from the bubbler, these gases are then injected into intake system of the engine. The water fuel cells are provided with electrical power from the dynamo of the engine. The input power is 13.8 V DC, 6A. It is found that the fuel consumption decreases and the value of the octane number of gasoline also increases [4]. Due to the ending stocks of fossil fuels, as well as instability of the political situation in the world, especially incountries that are major crude oil suppliers, governments of countries poor in the resources are forced to seek alternative sources of energy.Currently, the most common fuel for admission of internal combustion engines is oil. As a result of the continuous increasing of fuels prices and legislation imposing decrease of toxic exhaust gasses emissions tends to expansion the power base of the automotive industry through the introduction of alternative fuels. One of them is fuelsderived from renewable energy sources [5].The world of century 2000 present many critical challenges. One of the most important challenges concerns the environment .As population increases and the standard of living improves, there is an increasing concern that there will a shortage of energy to heat our homes and power the vehicles we clean air, clean water and biodegradable, renewable materials [6]. The aim of this work is to find out composition of exhaust gases from I.C engine when CNG, LPG, Petroleum are used. The main consequence of exhaust gases are environmental pollution. The environmental pollution depends upon presence of pollutants like CO, NOx, HC & PM. This paper aspires to find out the fuel that emits minimum pollution when used in the same automobile, thereby finding a cleaner,environment friendlier fuel [7].This paper investigates on green transportation in India, where usage of vehicles is increasing day-to- day. Increase in vehicles will lead to fuel scarcity in the mere future. These lead researchers to think about alternate fuel that can be utilized for the vehicles. This paper talks about the project which is aimed at developing and marketing a product with conventional standard that help in solving this issue. The basic function of the fuel system is to store and supply fuel to the cylindrical chamber where the fuel gets mixed with

air, vaporized and gets burned to produce energy. All the fuels are not completely burnt to produce energy [8]. In order to overcome the drawbacks of the regular petroleum fuel, it is the need of time to completely or partially replace the petroleum fuel. But alternative options to petroleum fuel are having disadvantages. An electric or compressed air driven cars cannot be used where high torque is required or using hydrogen as fuel requires very costly storage equipments. In this research work an attempt has been made to reduce the drawbacks of petroleum fuels. Electrolysis of water can give us hydrogen in form of oxy-hydrogen gas which can be used as an alternative fuel for any internal combustion engine [9]. Presence of carbon element in the conventional fuel like petrol and diesel leads to emission pollutions which are associated with the combustion process in traditional internal combustion engine loaded on automobiles. Increasing stringency in pollution norms is forcing the researchers to work on methods to reduce these emissions especially in the field of alternative fuels. Oxy hydrogen gas, which is enriched mixture of hydrogen and oxygen bonded together molecularly and magnetically and producer gas are emerging as best alternative fuels in the recent past [10]. Development of vehicles that could operate on alternative fuels began in earnest as a response to the oil shocks of the 1970s. Of the various choices, methanol appeared to be the best candida~ for long-term, widespread replacement of petroleum-based fuels. Initial support by the government was based on the desire for energy security, but the potential for improvement in air quality became an important driver as well[11].With the growth of modern civilization and industrialization in worldwide, the demand for energy is increasing day by day. Majority of the world's energy needs are met through fossil fuels and natural gas. As a result the amount of fossil fuels is on diminishing from year to year. Since the fossil fuel is non-renewable, so fuel price is gouging as a consequence of spiraling demand and diminishing supply [12].

2. EXPERIMENT SET UP-PROCEDURE PROCESS EXPLANATION

The engine is the device which converts heat energy into mechanical energy and also combination of various moving parts. we are selecting the HERO HONDA CD100cc bike this is manufacturing started Hero Honda motors limited in 1991. New motorcycle model - "CD 100CC" introduced 500,000th motorcycle produced the millage gives the CD100 60 to 65 kmps gives the mileage 74 km/lit, if the speed of the engine exceeds the 60 to 65 kmps mileage of the bike 58 -62 km/lit.

The specification of the HERO HONDA CD100CC

2.1 SPECIFICATION OF ENGINE:

Model	:	Hero Honda CD 100 CC
Bore	:	50.5 mm
Length of stroke	:	48.5 mm
Year	:	2006
Category	:	Sport
Rating	:	61 out of 100 it Show full rating and compare with other bikes.

Engine and Transmission

Displacement	:	97.20 cm (5.93 cubic inches)
Engine type	:	Single cylinder, four-stroke
Power	:	9.65 HP (7.0 kW)) @ 8000 RPM
Fuel control	:	OHC
Ignition	:	Electronic
Gearbox	:	4-speed

Transmission type

Final drive	:	Chain
Clutch	:	Wet multiplate

Chassis, suspension, brakes and wheels

Frame type	:	Back bone type
Front suspension	:	Telescopic hydraulic fork
Rear suspension	:	Spring loaded hydraulic type with both side actions

Physical measures and capacities

Weight incl. oil, gas, etc.	:	112.0 kg (246.9 pounds)

Overall height	:	1,050	mm	(41.3 inches)
Overall length	:	1,960	mm	(77.2 inches)
Overall width	:	720 mm (28.3 inches)		
Fuel capacity	:	10.1	liters	(2.67 gallons)

Other specifications

Starter : Kick

2.2 PRESENT USING FUEL SYSTEM

The compressed fuel supply system is a simple low cost fuel fumes delivery system that will replace the present day liquid fuel delivery system used on the present day internal combustion engines. The system will deliver a constant supply of fuel fumes for all ranges of required engine performance. This invention is designed for the standard modern internal combustion engine (5). Equipped with such standard equipment as fuel injectors (4), oxygen sensor/control unit (7) installed in the engine exhaust manifold. An air inlet control valve (6) located on the engine inlet manifold.

FUEL SUPPLY SYSTEM

2.2.1 HHO GAS KIT

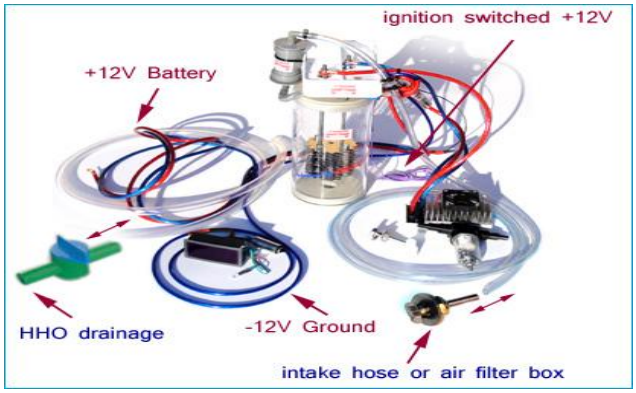

FIG1**:** HHO Gas Kit

2.3 LPG SUPPLY TO THE ENGINE

In LPG fuel supply fuel supply system is a simple low cost system that

will replace the present day liquid fuel fumes delivery fuel delivery system used on the present day internal combustion engines. The system will deliver a constant supply of fuel fumes for all ranges of required engine performance.In LPG fuel supply system same as the petrol system except the convertor or vaporizer the schematic diagram is shown in figure the one kg LPG cylinder is placed back side of the bike from this cylinder connect to the convertor through the pipe the convertor have the three portsOne is the inlet LPG gas from LPG cylinder other one is the out let of the LPG and third one is the vacuum port the convertor outlet of LPG connect between air filter and carburetor with help of pipes

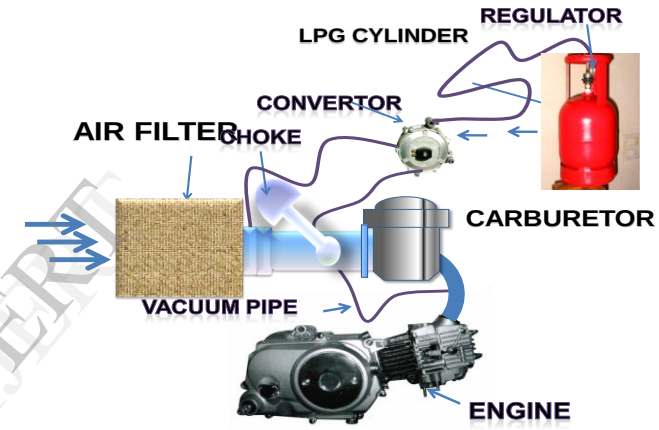

FIG 2: Schematic diagram of the LPG supply to the engine

The propane (LPG) gas flows from cylinder to convertor or vaporizer through the pipe by requesting regulated due to these high pressure propane gas not directly sent to engine so we are arranging converter this is also regulated pressure flow much succession created in the engine that much of pressure gas delivered from converter to the inlet of carburetor and this inlet gas mix with pressure air from the atmosphere through air filter these air filter mixture accelerated(regulated) by means of a carburetor through throttle valve by using this can accelerated the speed of the engine.

2.4 LPG CONVERSION KIT

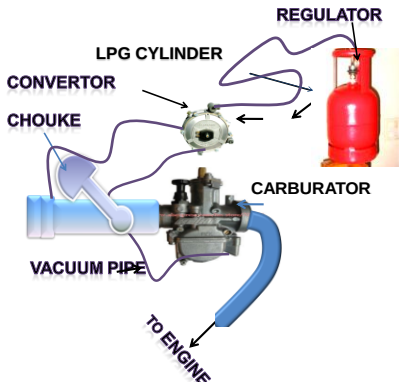

FIG 3: schematic diagram of lpg gas conversion kit

2.5 PETROL ENGINE TEST RIG:

The Test Rig provided study of a multi-cylinder four stroke petrol engine testing.A rig comprises of a Multi-cylinder Four Stroke Petrol Engine coupled to a Rope Brake Dynamometer. With the help of various measurements the test rig can determine - BHP, IHP, mechanical and thermal efficiencies, air fuel ratio, specific fuel consumption and heat balance sheets at various loads. Special arrangements are provided by switches for cutting off ignition of each cylinder for Morse Test.

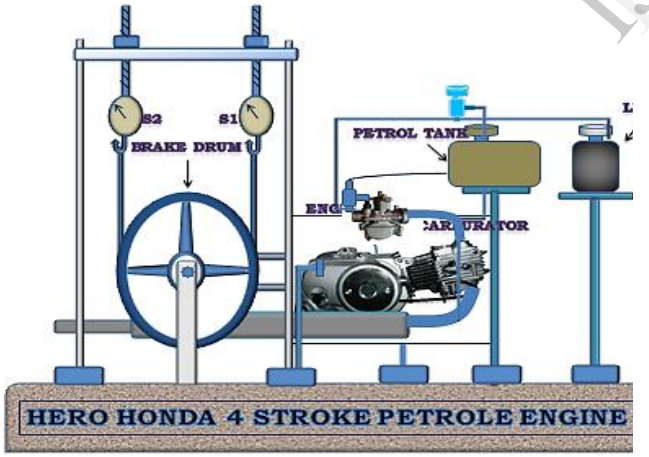

FIG4:Test Rig Of The Petrol Engine

3.RESULTS ANALYSIS

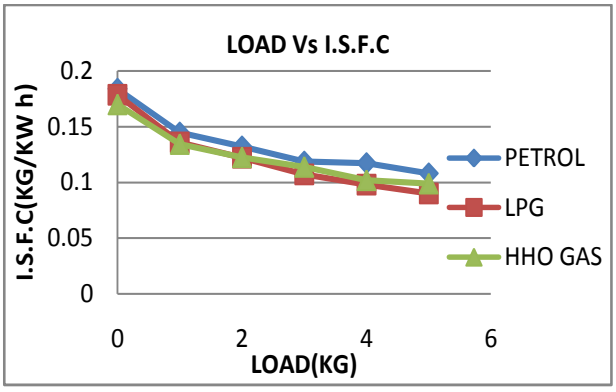

Fig.5: variation of I.S.F.C. Against with different load

From above the figure we can say that the I.S.F.C. of petrol with respect to load decreases with load but it is not economical when we compare with the I.S.F.C of LPG and HHO gas with respect to load.

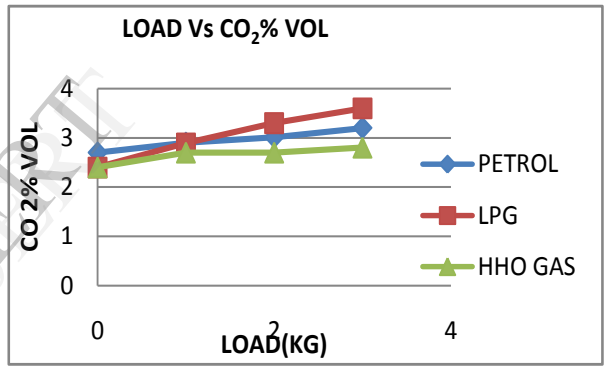

Fig 6: variation B.Th efficiency of against with different load

From above the figure we can say that the B.Th efficiency. of petrol with respect to load decreses with The B.Th efficiency of LPG (Liqid petrol gas), was higher than that of the conventional petrol fuel over the entire range of the load. when we compare with the B.Th efficiency of LPG gas with respect to load.

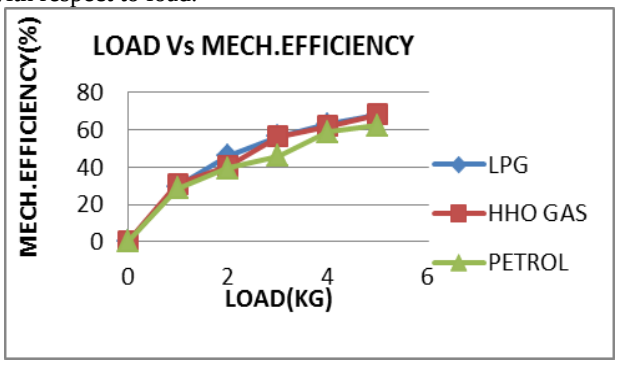

Fig.3: variation of Mech. Against with different load.

From above the figure we can say that the Mech. Efficiency of petrol with respect to load decreases with The Mech. efficiency of LPG (Liquid petrol

gas), was higher than that of the conventional petrol fuel over the entire range of the load.

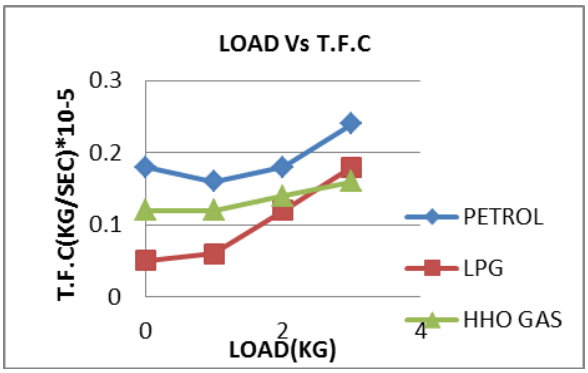

Fig.4: variation of TFCAgainst with different load

From above the figure we can say that the TFC of petrol is high with respect to load increases.The T.F.C of LPG (Liquid petrol gas) and HHO gas was less than that of the conventional petrol fuel over the entire range of the load.

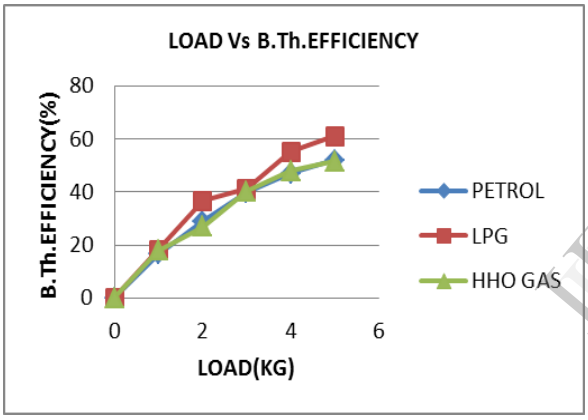

Fig.5: variation of CO2% VOL. Against with different load.

From above the figure we can say that the CO_2% VOLof petrol with respect to load increases, whereas the LPG (Liquid petrol gas) and HHO gas was less than that of the conventional petrol fuel over the entire range of the load. It is beneficiary in the environmental point of view.

By increasing of the percentage of co_2 and volagainst load of the petrol with respect to load The percentage of co_2 of petrol decreases as compere with LPG (Liquid petrol gas) gas, was higher than that of the conventional petrol fuel over the entire range of the load.that makes free pollutions on the environment .

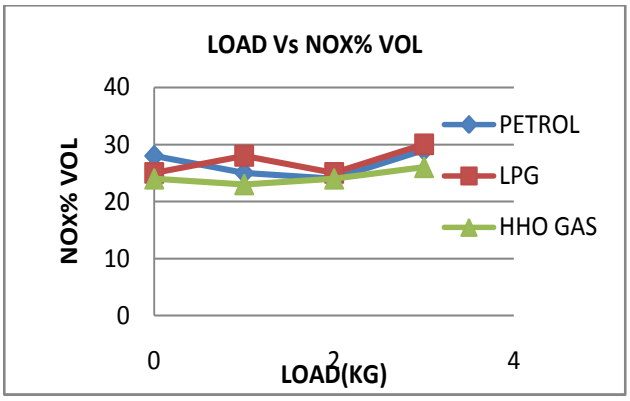

Fig.6: variation of No_x Against with different load

The percentage of No_X% of vol increases against load in case of LPG only when compared with the HHO and petrol. It is beneficiary in the environmental point of view.

4 . CONCLUSION

The performance and emission characteristics of conventional petrol, LPG and HHO gas were investigated on a single cylinder petrol engine. The conclusions of this investigation are as follows.

- Improved the engine performance in terms of brake power, mechanical efficiency, indicated power and knocking characteristics.
- The maximum brake thermal efficiency of 52 % was observed with the petrol and 60%obtained by with LPG.
- As the brake thermal efficiency increases and carbon monoxide, unused oxygen, hydrocarbons and smoke reduces with the increase of rice bran oil in diesel-biodiesel blends, the rice bran oil biodiesel can be used as an additive to mix higher percentages of diesel-biodiesel- blends for a diesel engine.
- As the brake thermal efficiency increases and carbon monoxide, unused oxygen, hydrocarbons and smoke reduces with the increase of rice bran oil in diesel-biodiesel blends, the rice bran oil biodiesel can be used as an additive to mix higher percentages of diesel-biodiesel- blends for a diesel engine.

REFERENCES

[1]. RuggeroMaria Santilli,"A new gaseous and combustible form of water", IJHYDENE, 2005, PP:1-16.
[2].Sumit Prasad, Er,Subodh Prasad ,Er, and AshisSaxena, Er., ,"Alternatively Electricity Generation in an Automobile An Alternative Fuel", IJTEMT, 2012,Vol.1,ISSUE6.
[3].YousefS.H, Najjar,"Alternative Fuels for Spark Ignition Engines",The Open Fuels & Energy Science Journal, 2009,vol. 2,PP: 1-9.
[4].Suleiman, Q, Abu-Ein, and Sayel M. Fayyad, 2011, "Experimental Hydrogen Booster Model", orld Applied Sciences Journal, 15 (8): 1168-1171.

[5]. Staša,Puškarić1*.,Damir,Oros2.,2012, "Effects of Various Fuel Blends on the Performance of a Two-stroke Internal Combustion Engine", RIThink, Vol. 2.
[6]. Anshu,Srivastava,Shakun, Srivastava, Nigam,A.C, "Alternative Fuel for Transportation", International Journal O f Environmental Sciences, 2010, Volume 1, No 2.
[7]. Karthik,T.S, Murali, Ganesh.S"Impact of Green Transportation In Today's Economy", APJMER, , November 2012, Volume 1, Issue 3.
[8]. YadavMilind, S.1*.,Sawant, S. M.2.,AnavkarJayesh, A.1., andChavan, Hemant, V.1., September, 2011, "Investigations on generation methods for oxy-hydrogen gas its blending with conventional fuels and effect on the performance of internal combustion engine",journal of Mechanical Engineering Research .Vol. 3(9),pp: 325-332.
[9].Yadav, Milind,S.1, Dr. S. M. Sawant2, "Investigations on oxy-hydrogen gas andproducer gas, as alternative fuels, on the performance of twin cylinder diesel engine", IJMET, 2011,Volume 2. Issue 2, pp: 85-98.
[10].Moinuddin,Sarker, Mohammad,Mamun,or Rashid, and Mohammed Molla, "New Alternative Vehicle Hydrocarbon Liquid Fuels from Municipal Solid Waste Plastics", Journal of Fundamentals of Renewable Energy and Applications, 2011, Vol. 1. Article ID R101201, 9 pages.
[11]. RobertaJ,Nichol, , "The Methanol Story: A Sustainable Fuel for the Future", journal of Scientific & Industrial Research, February2003, Vol. 62, pp: 97-105.
[12]. Md A. Hossain, Shabab, M, Chowdhury, YaminRekhu, Khandakar,S, Faraz, Monzur, Ul. Islam.,"Biodiesel from Coconut Oil: A Renewable Alternative Fuel for Diesel Engine", World Academy of Science Engineering and Technology 68, 2012.