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CONVERSION OF PETROL BIKE INTO LPG AND EMISSION CHECK

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ABSTRACT

An attempt has been made in this project to use alternative fuel in four stroke engine to increase the efficiency. 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. With this air is less polluted than conventional fuels. It is also good with regard to economical considerations and engine efficiency. In our project, we have installed LPG fuel system to four stroke vehicle where in we can use both gasoline and LPG. The alternations made to install LPG in the vehicle are discussed. For lower speeds LPG suitable for vehicle and gasoline is suitable for the higher speed operations. So, these combinations of fuel supply will be suitable for city traffic conditions, where mostly the mode of operation is low speed. Using this concept we can control our expenditure in buying of fuels.

Keywords: Gasoline, LPG, Gassifire, Carburetor.

1. INTRODUCTION

In the automobile field now the fuel used is known as petrol and fuel oil (Diesel). Petrol is a volatile fuel which is used in spark ignition engines and fuel oil which is used in compression ignition engine. Basically both the fuels petrol and diesel is obtained from the crude oil (i.e. petroleum). Now the problem is, its availability is decreasing day by day in bulk and insufficient for future decades. Hence an alternative fuel is essential to fight against scarcity. In term of long sight some alternative fuels are suggested and experimented by various manufacturing units with technicians, such alternative fuels are Methyl alcohol, Compressed Natural gas (CNG), Liquefied

Petroleum gas (LPG), In this project we have installed LPG as alternative fuel in two stroke Gasoline engine.

2. NECESSITY OF USING ALTERNATIVE FUEL

In the automobile field now the fuel used is known as petrol and Diesel. Basically both the fuels petrol and diesel is obtained from the crude oil (i.e.) petroleum. Now the problem is its availability is decreasing day by day in bulk and insufficient for future decades. Hence an alternative fuel is essential to fight against scarcity.In term of long sight some alternative fuels are suggested and experimented by various manufacturing units with technicians, such alternative fuels are as follows:

- Methyl alcohol
- Compressed Natural gas (CNG)
- Liquefied Petroleum gas (LPG)

In this project we have installed LPG as alternative fuel in four stroke Gasoline engine

2.1 Difference between LPG and Gasoline

Table No. 1-Gasoline vs LPG

Properties/fuel	**Gasoline**	**LPG**
Chemical structure	C_7H_{17}/C_4 to C_{12}	C_3H_8
Energy density	109,000-125000 MJ/Kg	84,000 MJ/Kg
Octane number	86-94	105+
Lower heating value(MJ/Kg)	43.44	46.67
High heating value(MJ/Kg)	46.53	50.15
Stoichimetric air/fuel ratio	14.7	15.5
Density at 15 degree Celsius	737	1.85/505

3. EMISSION FROM LPG AND GASOLINE

On an energy basis LPG has a lower carbon content than gasoline or diesel fuel. When used in spark-ignition engines, LPG produces near-zero particulate emissions, very little CO and moderate HC emissions. Variations in the concentration of different hydrocarbons in LPG can affect the species composition and reactivity of HC exhaust emissions. CO2 emissions typically are also somewhat lower than those for gasoline due to the lower carbon-energy ratio and the higher octane quality of LPG. NOx emissions are similar to those from gasoline vehicles, and can be effectively controlled using three-way catalysts. The higher CR of an engine, the more efficient is the engine and more is the power generated with given amount of the fuel. LPG has high octane rating of 110+ that allows CR to be high up to 15:1, which is in the range of 8:1 to 9.5:1 for gasoline engines.

4. ASSEMBLY OF GAS BIKE

In this section we discuss that how we use the LPG as a fuel in our 4 stroke bike. To get the system working, we put the LPG cylinder into a bag, and hanged it on the rear side of bike. The LPG converter was fixed under the fuel tank, right side of the bike. The inlet gas pipe is connected to inlet of the carburetor, and a vacuum pipe is connected to the inlet manifold of cylinder.

It is interesting to know that the methods we have used are very systematic and involve a lot of practical application of auto technology.
We use the bike of following specification:

4.1 Technical Specification of Engine

Table no. 2- Bike specification

Bike name	TVS Fiero F2
Cooling system	Air Cooled, OHC
Stroke	4-stroke
No of cylinders	Single cylinder
Compression ratio	9.4:1
Displacement	147.5cc
Electrical	12V,2.5Ah
Max power	12bhp/8.95kw@7000rpm
Max Torque	10.5Nm@6500rpm

4.2Major Component Used In Bike

1. Gas Cylinder
2. Low Pressure Gassifire
3. Carburetor

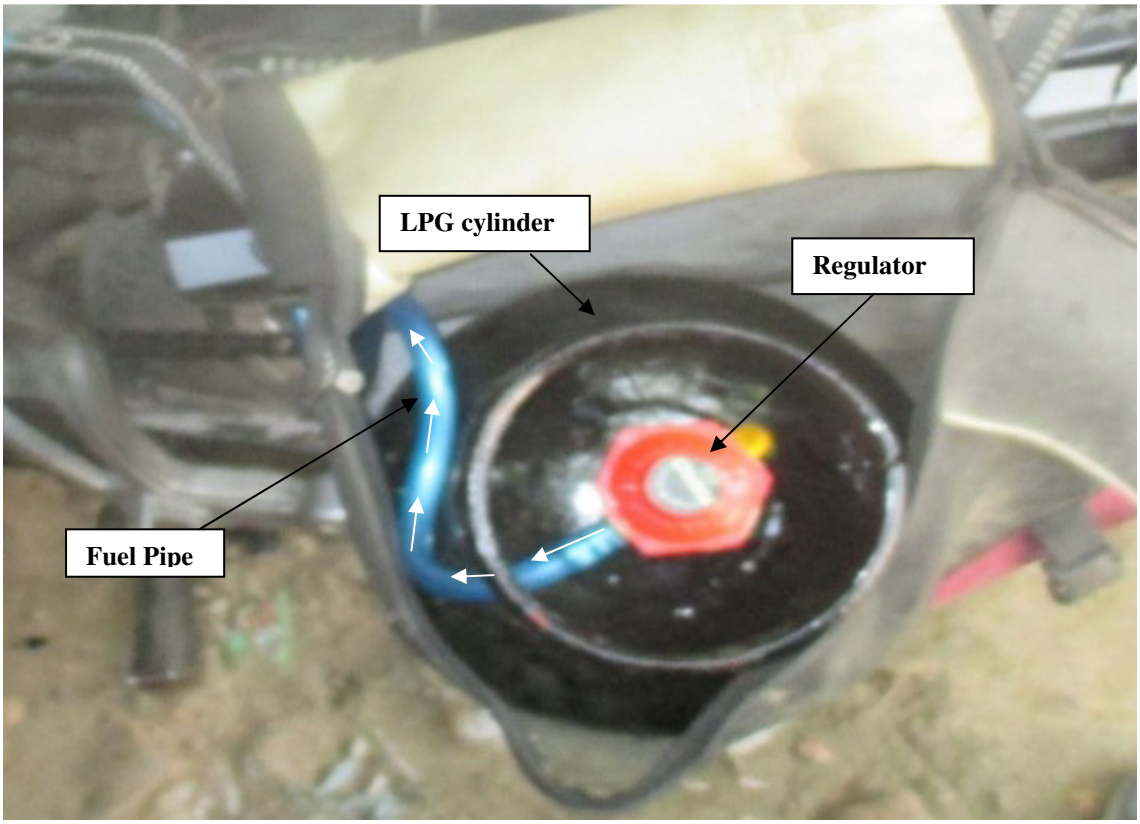


Figure 1: Shows Gas Cylinder

The figure no.1 shows the top view of the gas cylinder positioned in our bike. The connection of the gas supply pipe and regulator is shown in the figure no. 1.

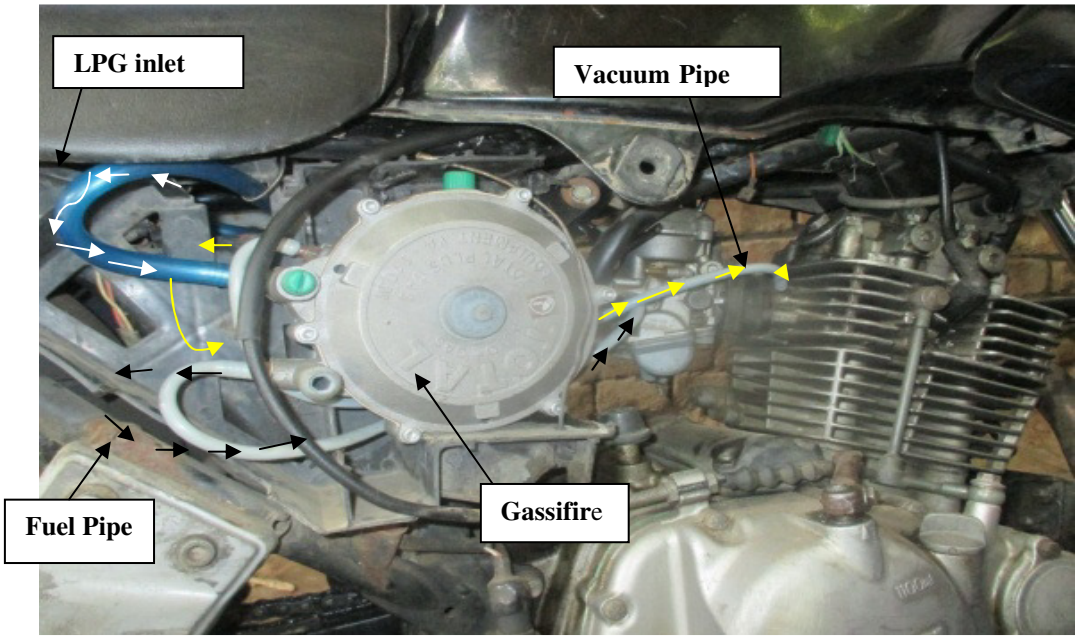


Figure 2: Shows Low Pressure Gassifire

Figure no. 2 shows the front view of gassifire. In this view the connections of gas supply from cylinder to gassifire and from gassifire to carburetor is shown. An another connection of vacuum pipe from cylinder inlet manifold to gassifire is also shown.

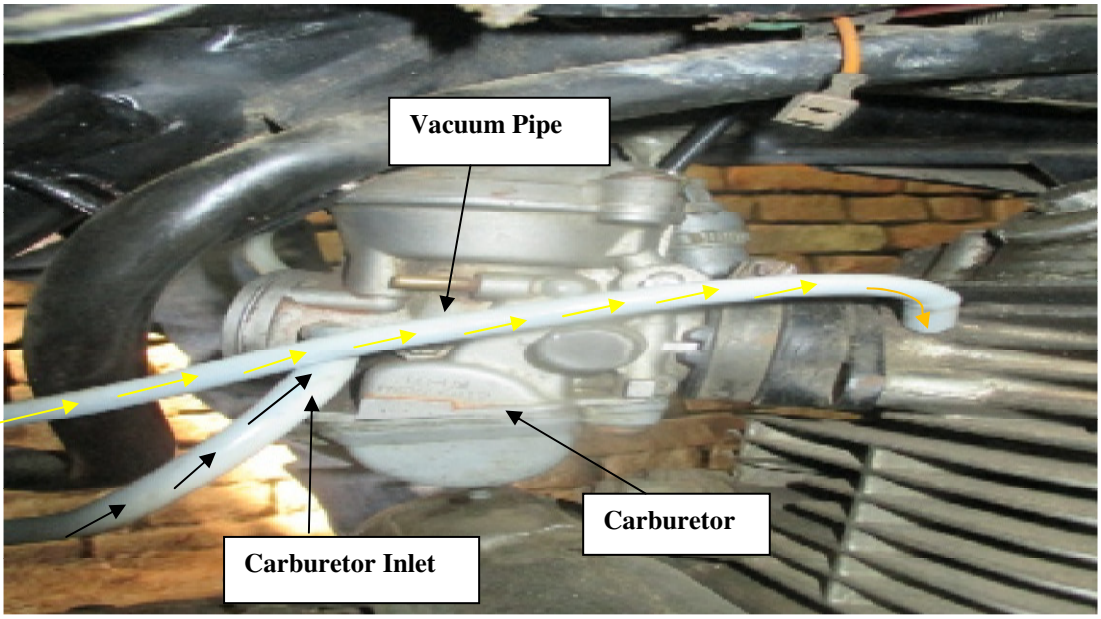


Figure 3: Shows Carburetor connections

Figure no. 3 shows the gas fuel inlet in the carburetor throttle and vacuum pipe connected in the cylinder inlet manifold. In this figure the modification in the carburetor throttle is shown which is made for gas fuel supply.

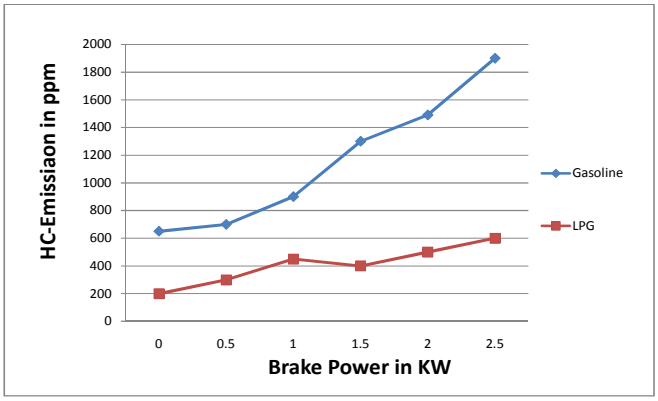
5. RESULT AND DISCUSSION

After attaching LPG equipment with our model of TVS Fiero F2 we found the following advantages of LPG over the Gasoline. We check the emission of our bike by Multi Gas Analyzer Model no. PEA 205.The obtained data tabulated in table no.3

Table No. 3-Emission Rates of Pollutants

S. No.	Emissions	Gassoline	LPG
1.	CO (gm/Km)	0.87	0.72
2.	HC (gm/Km)	0.14	0.12
3.	NO_X (gm/Km)	0.16	0.13

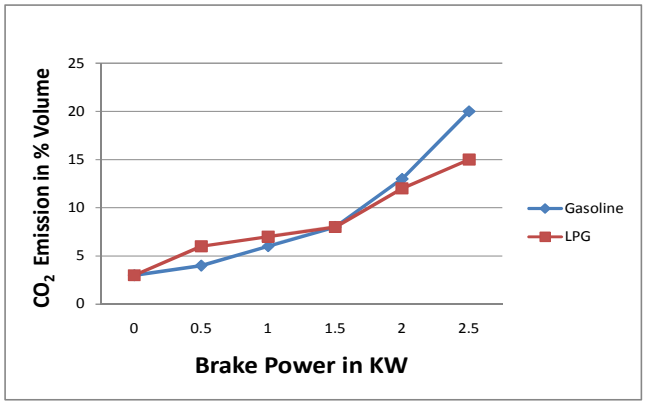
5.1 Brake Power vs HC-Emission



Graph no. 1-HC-Emission

From Graph no. 1 it is found that as the compression ratio increases, speed and HC emission increase. Maximum HC emission for LPG is 230 ppm at BP 1 KW, 500 ppm at BP 2.5 KW, and with petrol, 1835 ppm at 2.5 KW.

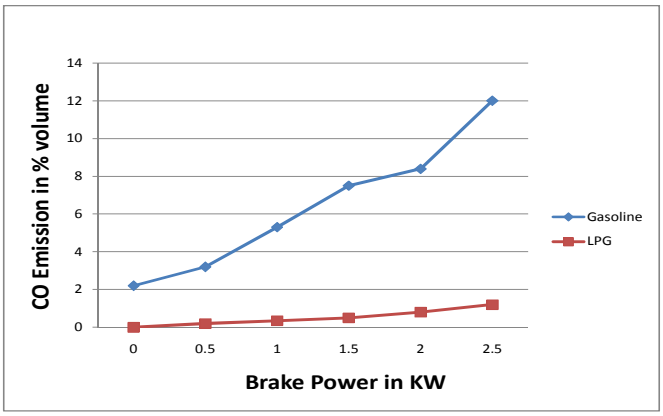
5.2. Brake Power vs CO_2 Emission



Graph no.2-CO_2 Emission

Graph no. 2 shows that Maximum CO_2 emission for LPG is 15% at BP 2.5 KW, and with petrol 20% at 2.5 KW, CO_2 emission increases with incomplete combustion of fuel and it is higher for petrol when compared with LPG.

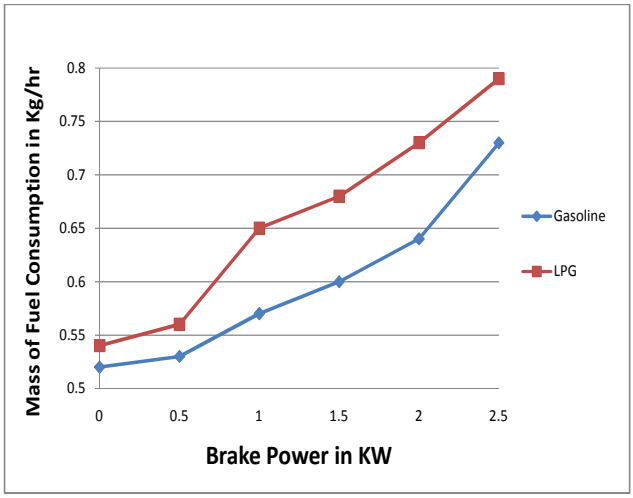
5.3 Brake Power vs CO Emission



Graph no.3-CO Emission

The Graph no. 3 shows that CO emission increases with incomplete combustion of fuel and it is higher for petrol when compared with LPG at different brake powers. The maximum CO emission is 12% for gasoline and 1.9% for LPG at brake power 2.5 KW.

5.4 Brake Power vs Mass of Fuel Consumption



Graph no. 4- Fuel consumption

Graph no. 4 indicate that the mass of fuel consumption gradually increasing w.r.t. increasing the Brake Power. The maximum mass of fuel consumption with LPG is 0.7523 kg/hr at 2.350 KW. And maximum mass of fuel consumption with petrol is 0.7313 kg/hr at 2.350 KW.

It's clear from above graph that LPG increases mass of fuel consumption of the engine in comparison with petrol.

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