

## Review on LPG as Alternative Fuel for Two Wheelers

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**Abstract**— An attempt has been made in this paper to use alternative fuel in four stroke Gasoline engine. Our aim in selecting this paper is to use non conventional fuel against conventional fuel which is becoming scarce and costly now days. By using LPG as fuel, the air is less polluted than conventional fuels. It is also good with regard to economical considerations. In our paper we have installed LPG fuel system to four stroke vehicles, where in we can use both gasoline and LPG.LPG from storage tank comes to the adjustable regulator through a primary delivery valve fitted at the mouth of the LPG cylinder.

**Keywords:** Performance Testing, Gassifire, Fuel Economy

### I. INTRODUCTION

In this paper we have studied that the LPG fitted bike runs both petrol as well as on LPG. Nowadays the prices of petrol are increasing day by day. So, to provide relief to the common people, we need to focus on non-conventional fuel to be used in the two wheelers. In this paper, they have fitted a LPG tank in the frame welded to the chassis in the front side of the bike. The LPG converter was fixed to the rear seat hand grip, and the inlet pipe connected to inlet of the carburetor, and finally a vacuum pipe to the inlet manifold. Later on, they test rode the bike for about 5 KMs during which they found hardly any difference in the performance and handling with that of a petrol bike. Meanwhile, they also found that the bike can give mileage of up to 135 KM per kg of LPG. In case LPG gets over, it is possible to switch over to petrol. Since LPG costs Rs 65 per KG, the KM cost of this bike is 25 paisa per KM. assuming a mileage of 60 KMPL and petrol cost of RS 70, the equivalent cost for petrol is Rs 1.20 per KM.

This means that the LPG running cost of this bike is a whopping 80% cheaper than with petrol. LPG on two wheeler will be a great development for the world. As the two wheeler runs quite smoothly in LPG and in fact as good as petrol, this seems like a very good invention. Except the starting problems, this technology is perfectly usable. The LPG means Liquefied Petroleum Gas. The calorific value of LPG is 27.800 Kae/map approximately. Natural gas technology I.C engines beats the current emission standards for hydro carbons (HC) and nitrous oxide (NO) by more than two treads and level for carbon dioxide (CO) by more half. LPG consists of Hydrocarbons of such volatility that they can exist as gas under atmospheric pressure but can be readily liquefied under pressure. Air pollution is fast becoming a serious urban as well as global problem with the increasing population and its subsequent demand. Finding an alternative to conventional fuels would help to reduced it. Vehicles running on cleaner fuels produce fewer harmful emissions, and can offer some savings on fuel cost, compared with petrol or diesel.

### II. LPG (LIQUEFIED PETROLEUM GAS)

LPG (LIQUIFIED PETROLEUM GAS) is a naturally occurring fuel and it is also produced through the cracking or refining process for other hydrocarbons. LPG if compressed or refrigerated can be stores as liquid or at ambient temperatures it can be stored in containers as a liquid under slight pressures.

LPG is the name given to the mixtures of commercial butane and propane.

The LPG is normally composed of Propane and Butane mixed in different proportions. The formulas of Propane and Butane are;

- Propane C<sub>3</sub>H<sub>8</sub>
- Butane C<sub>4</sub>H<sub>10</sub>

As mentioned above the composition of LPG at the pump (around the world) can be found in many mixtures ranging from pure Propane through various ratios of Propane and Butane to pure Butane.

### III. BLOCK DIAGRAM

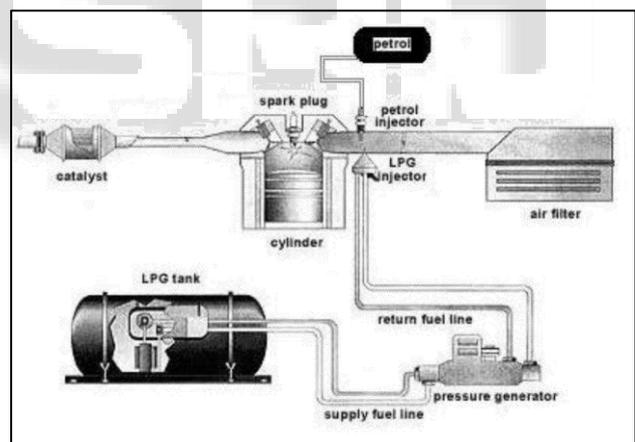


Fig. 1: LPG System Assembly to Engine[1]

### IV. COMPONENTS OF LPG SYSTEM

- 1) Housing
- 2) Bracket Assy
- 3) Drainer Assy
- 4) Gasified Assy
- 5) Solenoid valve
- 6) Control Circuit & Wiring
- 7) Container / Cylinder Assy
- 8) Regulator Assy
- 9) Pipe Assy. / Cylinder Belt
- 10) Nozzle / Venture Assy
- 11) Gas Filling Attachment Assy
- 12) RVO Power Enhancer
- 13) Electronic PWR 2T-Oil System

#### 14) Mechanical Oil Pump

##### A. Low Pressure Gassifire

The Low Pressure Gassifire is a device which is used to reduce the pressure of the LPG coming from the tank. It also converts the gas into liquid form which is then fed to the carburetor. It is found that with the conversion of gas into liquid, the burning of the fuel air mixture in the combustion chamber, is more complete. Hence, it is necessary to convert the gas into liquid and this function is performed by the low pressure gassifire.



Fig. 2: Low Pressure Gassifire

##### B. LPG Solenoid Valve

The LPG Solenoid Valve is an electromagnetic device that stops the flow of LPG when the engine is stopped or operated with petrol.

The solenoid LPG Valve is composed of:

- 1) NBR seals to guarantee absolute safety
- 2) High thermal induction coil wire to render its working life virtually unlimited
- 3) Self extinguishing coil covering resin
- 4) Gas filter made with a fine filter paper material.



Fig. 3: LPG Solenoid Valve[1]

##### C. Petrol Solenoid Valve

The Petrol Solenoid Valve is an electromagnetic device widely used in carburetor vehicles. Its function is to stop the flow of Petrol when vehicle is running with LPG and vice versa when the vehicle is operated with Petrol. The petrol Solenoid valve is installed in the line of Petrol fuel near the engine compartment. The Petrol Solenoid valve is normally closed when electricity is switched off. It is basically composed of a shutter operated by a magnetic coil and two

nipples. It is also equipped with an emergency device to manually reset the petrol flow in case of a break down in the electrical system.



Fig. 4: Petrol Solenoid Valve[1]

##### D. Petrol-LPG Changeover Switch

Petrol-LPG Changeover switch is used to switch the flow of petrol or LPG into the carburetor. It comes with three positions. In case, the bike is to be operated on petrol, the switch is put on the first position. When in operation with LPG, the switch is put on the third position and when the switch is put on the middle position, the flow of both, LPG as well as petrol is stopped to the carburetor.

##### E. Mixers with Carburetors

Mixer helps to provide correct AIR-FUEL ratio to the carburetor so as to get better fuel economy. At starting conditions of the bike, more rich mixture is needed whereas at the normal running condition, lean mixture is needed. This variation of mixture is maintained by the mixer with carburetor.

##### F. Tanks:

The function of the tank is to store the LPG at high pressure and deliver it to the carburetor, whenever required, through a valve.



Fig. 5: LPG Filler Tank with Regulator[1]

##### G. RVO Power Enhancer

This supersaver Reed Valve Operated device specially developed to work in tandem with the gassifire does not allow any fuel wastage by the kit and enhances the power output of the engine, for example: - if an engine has a top speed of 100 Km./hour on petrol then on gas system with this device, ensures that the engine will give a top speed of 105 Km/hour. Emitting pollution levels also comes to near zero.

##### H. Oil and Dirt Separator

The oil and dirt separator is required to ensure that clean LPG gas is fed to the engine so that there is complete combustion. In case the LPG gas contains any dirt or foreign particles, the dirt separator comes into action and traps it supplying clean fuel to the engine.

## V. METHODOLOGY

- 1) The LPG kit, pressure valve and regulator are assembled with each other as per the shown in the experimental setup.
- 2) "ON" the LPG cylinder regulator.
- 3) Before start the engine ensure any leakages in the set up.
- 4) LPG supply to the engine is controlled by a regulator or vaporizer. This converts the LPG into a vapor.
- 5) The vapor is fed into a mixer located near the intake manifold. Where it is mixed with filtered air before being drawn into the combustion chamber.
- 6) When we apply load on rope dynamometer it will get heated up. So we will continually supply coolant water.
- 7) At different load conditions we will take shaft speed in RPM with the help of tachometer, using different fuels i.e. Gasoline, LPG.
- 8) Time collection of 30cubic capacity of fuel consumption for Gasoline and 16g LPG consumption using at different load condition.

## VI. CONCLUSION

On review of this paper, we conclude the following results:

- By using LPG as fuel in two wheelers, it is found that the fuel economy of the bike is increased nearly by 60-70% as compared to petrol bikes.
- By using LPG fuel, the Carbon and NOX emissions are reduced leading to low pollution.
- By using LPG fuel, the performance of the bike is same as that of petrol bike. Hence, the running cost of the bike is reduced with same performance.

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