

FABRICATION OF LPG POWERED 4-STROKE TWO WHEELER

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Abstract - In India two wheeler play a major role for transportation. Most of the motor cycle uses four stroke engine which is majorly run by petrol. In recent days petrol price reaches the peak. Also petrol and diesel plays a vital role in global warming. We have seen car running on LPG. Here we use LPG as alternate fuel for two wheeler with some modifications. LPG is cheaper than petrol and it is a clean gas. LPG has a higher octane rating than petrol. The exhaust emission also comparatively reduced by using LPG. The wear of the engine is reduced by using LPG, hence the engine life increases. In this paper normal petrol tank is removed from the four stroke gasoline engine powered bike and LPG tank is fitted with some modifications. The emission of the LPG bike is less when compared to gasoline bike. The emission from the LPG powered four stroke bike is tested and reported.

efficiency of this type of engines are found to be better than that of the conventional engine which uses only petrol.

2. BLOCK DIAGRAM

The block diagram represents the overview of the LPG powered motorcycle working principle. The working layout consists of the air filter, carburetor, LPG tank, reducer, vacuum pipe, engine cylinder and catalytic convertor. The block diagram shows the working of the LPG powered four stroke two wheeler. The air from the atmosphere is flow through the air filter. The LPG gas reaches the carburetor through reducer and vacuum pipe. The air and LPG gas mixed up in carburetor to reach the engine cylinder at the end of combustion stroke.

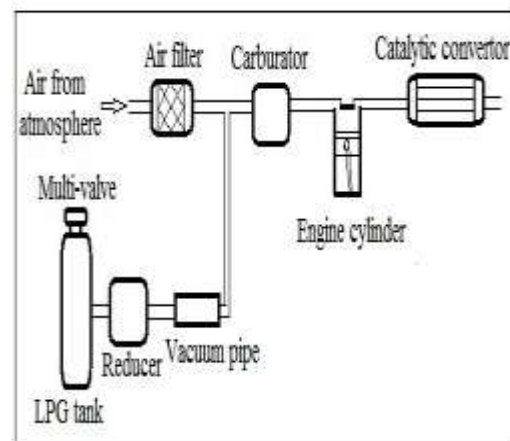


Fig -1: Block diagram

Key Words: LPG, alternate fuel, octane rating, global warming, emission.

1. INTRODUCTION

The most commonly used fuel in automobile is petrol and diesel which is extracted from crude oil. Now the problem is its availability decreasing day by day in bulk and may be unavailable in future. Hence an alternative fuel is essential to overcome this problem. Some of the alternative fuels are experimented and suggested by manufacturing units by technicians. Some of the alternate fuels are as follows:

- Methyl alcohol,
- Compressed Natural Gas (CNG),
- Liquid Petroleum Gas (LPG).

In this project we use LPG as alternative fuel in four stroke gasoline engine powered bike. The experimental setup of our project consist of an ordinary four stroke gasoline bike, gas tank, multivalve, LPG vacuum pipe, reducer, copper hose, filling valve and accessories. The engine of the bike is a four stroke petrol engine. The required modifications are made to this bike to convert the bike to LPG powered four stroke two wheeler. The carburetor of the bike is slightly modified such that the gas from the gas tank enters the carburetor and mixes up with the fuel and the combustion takes place. The concentration levels of CO, CO₂ and unburnt HC recorded are found to be lower than the gasoline fueled engine. The wear of the engine running in LPG is gradually less when compared to gasoline, hence the engine life increases and also maintenance cost also reduced. The

3. COMPONENT USED

Table -1: Components used

SL.NO.	ITEM/COMPONENT
1	Bike
2	LPG tank
3	Multivalve
4	Reducer
5	LPG vacuum pipe
6	Copper hose
7	Filling valve

3.1 BIKE

In this project we use TVS victor bike. It is a four stroke gasoline engine powered bike.



Fig -2: Bike

3.2 LPG TANK

The LPG tank is used to store LPG in the four stroke bike. The tanks are available in different shapes and capacities. The most commonly used shapes are as follows:

- 1.cylindrical shape
- 2.toroidal shape.

We used 4.5 liter capacity cylindrical shaped LPG tank.



Fig -3: LPG tank

3.3 MULTIVALVE

A multivalve consists of float, level gauge, solenoid valve, filling inlet, service outlet, overfill protection device, pressure relief device and flow limiting device. The LPG is filled through filling inlet. The overfilling protection device is used to cut the gas supply when the tank is full. The gas is supplied to the engine through service outlet. The gas flow is controlled by using flow limiting device.



Fig -4: Multivalve

3.4 REDUCER

A high pressure gas enters the high pressure chamber or valve chamber through inlet. The adjusting knob turns clockwise to compresses the range spring and exerts a downward force on the diaphragm, which in turn pushes the valve stem open. This releases the gas into the low-pressure chamber, exerting an opposing force on the diaphragm. An equilibrium is reached when the range spring force acting downwards on the diaphragm is equal to the combined upward forces of the gas in the low pressure chamber. Thus the high pressure gas is converted to low pressure gas which is flow through outlet.



Fig -5: Reducer

3.5 LPG VACUUM PIPE

It is the mechanically operated vacuum pump. It is the safest gas system of the world. The reducer releases the gas only when the piston generates the stroke. If the engine stops for any reason the gas supply cuts immediately.



Fig -6: LPG vacuum pipe

3.6 COPPER HOSE

The copper hoses can be manufactured in soft and rigid types. It offers excellent resistance to corrosion and reliable connections. Here we use 6mm rigid type copper hose.



Fig -7: Copper hose

3.7 FILLING VALVE

Filler valve is used to refill the LPG gas into the LPG storage tank.



Fig -8: Filling valve

4. WORKING



Fig -9: Assembled LPG tank

The working of the LPG powered bike is very similar to the gasoline powered bike. The LPG gas from the LPG storage tank reaches the carburetor through reducer and LPG vacuum pipe. The gas enters the high pressure chamber or valve chamber of the reducer through inlet. The pressure is reduced by the diaphragm then the gas passes through the outlet through the low pressure chamber. The pressure of the LPG gas is reduced in the reducer. The fresh air from the atmosphere reaches the carburetor through air filter where is dust particles from the atmospheric air is removed. The air and LPG gas is mixed inside the carburetor. The LPG gas is

further mixed up with air at specific air-fuel ratio. The mixed air and LPG gas enters into the combustion chamber at the end of compression stroke in the four stroke two wheeler. The LPG gas is allowed to enter into the engine cylinder at specific pressure. The air-fuel ratio varies according to the performance and efficiency of the vehicle.

5. EMISSION TEST REPORT



Fig -10: Emission test report

The above image shows the emission report of the LPG powered four stroke two wheeler. The emission of LPG motorcycle is tested in the pollution testing center to satisfy the government emission regulation limit. From the emission test report, the result of the emission test satisfies the government regulation limit and norms.

6. LPG VS GASOLINE

The below table represents the comparison of cost, mileage and emission of petrol and LPG. From the below table it is clearly understand that the cost of LPG is cheaper than petrol. Also LPG give greater mileage when compared to petrol. The emission of the bike while running in LPG is decreases when compared to petrol.

Table -2: LPG vs Gasoline

	Petrol	LPG
Cost/litre	Rs.73.59	Rs.39.86
Mileage/litre	64kmpl	76kmpl
Rupees/km	Rs.1.15/km	Rs.0.53/km
Engine capacity	109.7cc	109.7cc
Emission of Co in %	1.972	1.445
Emission of HC in ppm	1680	1252
Emission of Co ₂ in %	14.4	12.36
Emission of O ₂ in %	2.19	1.49

7. CONCLUSION AND RESULT

Following are the result obtained while we attached the LPG system over the gasoline.

- The consumption of fuel is less due to best vaporization of the LPG gas when compared to petrol.
- The pollution of the LPG bike is less when compared to gasoline.
- The cost of LPG is very cheap when compared to gasoline.
- The efficiency of the LPG bike is more when compared to gasoline.
- The wear of the engine running in LPG is less when compared to gasoline powered engine.
- The maintenance cost of the bike also decreases when compared to gasoline bike.
- The operating cost of bike is gradually decreases when compared to gasoline powered bike.

8. FUTURE SCOPE

In this modern period the technology is developing day by day. Now a days the fuel-injection bikes comes to market which gives proper air-fuel ratio and good throttle response whenever required without wasting the fuel. By using those technology in this project can be more efficient without loss of engine power output.

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