

LPG As Alternative Fuel for Two Wheelers

Dr.Sureshkumar K¹, Rajesh Kannan M², Vignesh P³

Head, Department of Mechanical Engineering, Jayaram College of Engg.&Tech, Trichy, India¹

UG Scholar, Department of Mechanical Engineering, Jayaram College of Engg.&Tech. Trichy, India^{2,3}

ABSTRACT: An attempt has been made in this paper to use alternative fuel in four stroke Gasoline engine. Our foremost aim in selecting this paper 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. 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. Safety precaution can be used.

I. INTRODUCTION

The LPG means Liquefied Petroleum Gas. It is also called as bottled gas (or) Refinery gas. It is obtained as a by product during cracking of heavy crude oils or from directly obtained natural gas. The LPG obtained either from cracking or from CNG (Compressed Natural Gas) is dehydrated, desulphurised and traces of organic sulphide (Mercaptans) are added to give warning of gas leak. It is then filled in cylinders and compressed to that extend the fuel gas in liquid state and supplied under the trade name like INDANE-BURSHANE, and many other such suppliers. The calorific value is 11,900 Kcal/kg approximately. Natural gas technology I.C engines beats the current emission standards for hydro carbons (HC) and nitrous oxide (NO) by more than two thirds 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.

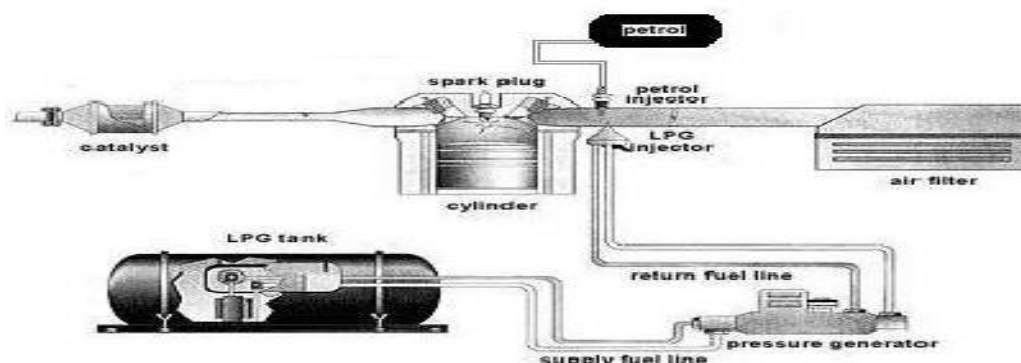
Objectives of Our Project:

Our project have many objectives, some of them are as follows:

1. Reducing the running cost of the vehicle by using cheaper fuel in the engine.
2. Avoiding emission of the engine by burning a clean fuel in the engine.
3. Increasing engine running life
4. Preventing scarcity of Non-regenerative fuels by reducing their uses.

To achieve these objectives in our project we need following components.

II. BLOCK DIAGRAM



List of Components Required:

- Bike
- LPG kit
- Multifunction Valve (Filler Connector , Fuel Indicator , Petrol Solenoid Valve)
- Electronic Control Unit
- Pressure Regulator
- Wire Harness
- Auto LPG Hoses
- Mixer Assembly
- Change-Over Switch
- LPG

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. 5. Vibration resistance. 6. Multiple fitting positions.

LPG Solenoid Valve 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 sy

Petrol-LPG Changeover Switch:

This is a three position electronic switch, the first position is PETROL and the second is LPG. Obviously when positioning the switch on petrol the switch will close the LPG Solenoid Valve and it will open the Petrol Solenoid Valve and vice versa. The Mid position of the switch (third position) is use to maintain the LPG and the Petrol Solenoid valves in the OFF position until the carburetor uses the small Petrol reserve. With a carburetor engine gas switching is always done manually. The switch for carburetor engines also has a safety feature; it stops the gas flow to the engine when engine accidentally stops.

Mixers with Carburetors:

The mixer with carburetor has an extremely importance. The right AIR- FUEL ration depends on the mixer and this is the reason for the existence of so many versions bearing so many shapes. The mixer for vehicles equipped with a carburetor may be manufactured with a specific Venturi or by implanting a nozzle in the proximity of the carburetor's original Venturi. The nozzle system type mixer can perform very well if executed with care and knowledge. In any way, is good to remember, that this system is not always possible to adapt to all carburetors and if not properly installed it may create irreversible damages to the carburetor.

Tanks:

- Available in 18 different approved sizes to suit most vehicles in India. The two variant available are called
1. Cylindrical type.
 2. Toroidal type. The tank also has different capacity variants

Mechanical Oil Pump:

This is a mechanical vacuum operated 2T-Oil Pump and is a alternate, direct replacement to electronic PWR 2T oil system. Safest gas system of the world.LPG kits function on “lean burn system” and operates at extremely low pressure. Thereby maximizing fuel efficiency and overall system safety.Gassifire releases gas only when the piston of the vehicle generates a stroke, as soon as engines stops for any reason the gas supply to engine cuts of automatically.

Scope:

As of rising population and limited source of transportation in the metropolitan city like Mumbai, A bike having good maintenance, Low running cost and less Emission have a good scope to replace conventional single fueled petrol or diesel powered engine.

Significance :

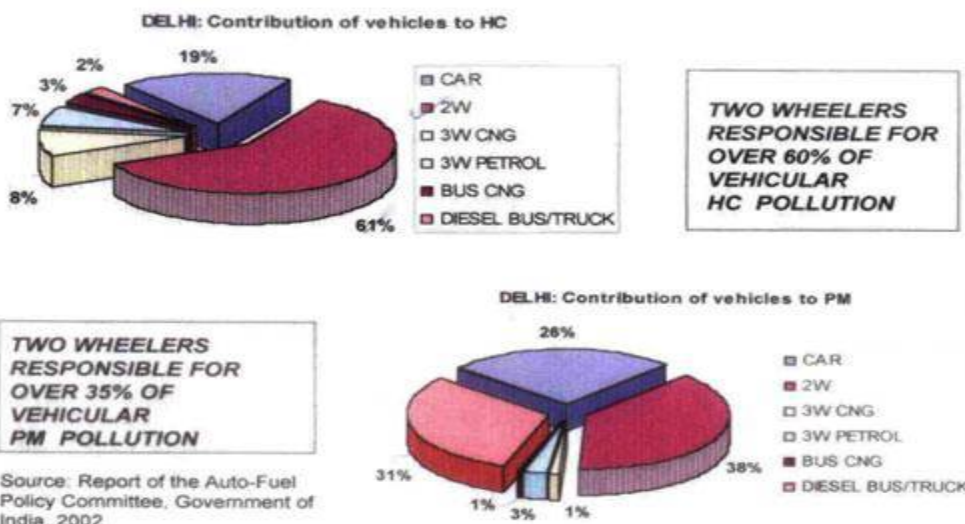
Carburetor technology has failed to control the uneven supply of petrol with the incoming air stream to engine at various levels. It is inbuilt and inherent draw back that in some circumstances the sucking air stream sucks excess petrol at carburetor venturi, resulting in petrol wastage and pollution.

Now let us replace this redundant carburetor technology with new revolutionary LPG gas technology, which promises:

- ☐ Cent % fuel efficiency.
- ☐ With clean exhaust and Zero Pollution

If this new technology is implemented with right spirit in India alone, on in-use vehicles (Existing Vehicles) plus new vehicles added during the year, then new LPG gas technology will save fuel worth Rs.200 crores per day. Or 73000 Crore rupees (Seven Kharab Thirty Arab Rupees) annually in foreign exchange only. Even more importantly this will prevent entry of 1.5 crores tons of carbon and NOx pollutant from Air per day in India alone LPG Project will drastically improve Air quality, millions of urban people suffering from Air Pollution. Even lot more saving will be on account of engine life & maintenance.

CONTRIBUTION OF DIFFERENT TYPES OF VEHICLES TO HYDROCARBON (HC) AND PARTICULATE MATTER (PM) POLLUTION



CONTRIBUTION OF DIFFERENT VEHICLE

EFFICIENCY AND PERFORMANCE

ENGINE cc	Petrol Km./ltr.	Rs./ Km.	LPG Km./ltr.	Rs./ Km.	Remark
100cc to 125cc	60 km/ltr.	Rs.2.50/km	72km/ltr.	Rs.2/km	LPG/ ltr.cost calculated on commercial/auto LPG gas
350cc to 500cc	40km/ltr.	Rs.3.25/km	50km/ltr.	Rs.2.80/km	LPG/ltr.cost calculated on commercial /auto LPG gas

Fuel saved 50% to 75%

Following the experimental methodology can be used:

- ☐ The LPG kit, pressure valve and regulator are assembled with each other as per the shown in the experimental setup.
- ☐ "ON" the LPG cylinder regulator.
- ☐ Before start the engine ensure any leakages in the set up.
- ☐ LPG supply to the engine is controlled by a regulator or vaporizer. This converts the LPG into a vapour.
- ☐ When we apply load on rope dynamometer it will get heated up. So we will continually supply coolant water.
- ☐ At different load conditions we will take shaft speed in RPM with the help of tachometer, using different fuels .i.e. Gasoline, LPG.

III. SAFETY

In terms of combustion, LPG is similar to petrol. The vehicle's LPG tank is in fact much stronger than a conventional fuel tank as the gas is stored inside it under moderate pressure. All tanks are fitted with electric shut off valve, fill point, pressure relief valve.

- a. LPG tank and the piping system should be checked regularly for any leakage.
- b. It is recommended to run the vehicle 5 to 7 km in petrol mode after every 100 to 150 km. running LPG mode, to keep the petrol system in good condition.
- c. Switching over directly from petrol mode to LPG may lead to engine stalling (or) back fire due to mixing of both fuels.
- d. After refueling LPG, please ensure that the dust plug is inserted back on the filler valve.

Actual Advantages:

Friendly Environment

Propane, or liquefied petroleum gas, is paraffin: although a petroleum product (it can also be produced from natural gas), it contains none of the olefins or aromatics that produce smog. Propane mixes very well with air, and, like compressed gas, is already vaporous when mixing in the injection ports of carburetors, reducing the pollutants ordinarily released when an engine turns over. Propane has significantly lower carbon monoxide and hydrocarbon emissions, and causes nitrogen oxide emissions that, while no lower than gasoline, are not significantly higher, either. CNG (Compressed natural gas) or LPG (Liquid petroleum gas) has been recognized the world over as an efficient, safe, reliable, environment friendly and economical alternate fuel for automobiles. Both CNG and LPG are being used in many developing and developed countries and many people are opting for them

IV. LIMITATIONS

There are some of the limitations of our projects, they are:

- ☐ Less LPG refueling stations.
- ☐ Rural areas don't have Natural gas filling stations.
- ☐ Small LPG tank.
- ☐ Cost for conversion of bike is high.

V. CONCLUSION

- ☐ Low fuel consumption based on best vaporization.
- ☐ Perfect system for bio-fuel (gasoline, LPG. and CNG) and Monofuel (LPG or CNG only).
- ☐ Due to combustion very low effect on environment.
- ☐ Easy and convenient work by small size and light weight
- ☐ More efficiency as compared to other fuels.
- ☐ Due to LPG there is no effect on engine operation
- ☐ Save fuel save money

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