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RESEARCH ARTICLE

TWO STROKE HYBRID VEHICLE

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ABSTRACT

Petrol is used as a conventional fuel for many past years. So the dependency on petrol has increased greatly. Due to which depletion of energy sources (i.e. Fossil Fuels- Gasoline and Diesel) have occurred. Therefore there is requirement of hybrid engine, by which dependency on petrol and diesel can be decreased. Now days, people are facing problem of high fuel prices and harmful emission from vehicle which affects directly or indirectly on environment and human health. Aim of our project is to reduce the exhaust emission by running the vehicle on LPG (liquefied petroleum gas)as an alternative fuel for two stroke SI engine. This results in perfect balance in fuel consumption and pollution control which can be optimized in future generation vehicle. Using this concept, two fuels can be effectively transformed to hybrid with increasing fuel efficiency by 30 percent. Two stroke S.I. engines are having poor fuel economy and while using Petrol as a fuel; it emits high hydrocarbons and greenhouse gases.

INTRODUCTION

Petrol

Two stroke SI engine have high power to weight ratio and simplicity in design. Use of alternative fuel is increasing nowadays, as their price is more than of petrol or diesel. In addition, LPG powered vehicles are producing less pollutants as compared to petrol or diesel (60 % less CO, 30 %less HC and 20% less NO_x in comparison with gasoline). Un-burnt gasoline and evaporation from the tank, when in the atmosphere, react in sunlight to produce photochemical smog. Vapor pressure initially rises with some addition of ethanol to gasoline, but the increase is greatest at 10% by volume. At higher concentrations of ethanol above 10%, the vapor pressure of the blend starts to decrease. At a 10% ethanol by volume, the rise in vapor pressure may potentially increase the problem of photochemical smog. This rise in vapor pressure could be mitigated by increasing the percentage of ethanol in the gasoline mixture.

LPG (Liquefied Petroleum Gas)

LPG refers to the propane or butane or the mixtures of propane (C3H8) and butane (C4H10) in same container with specific ratio. Propylene and but yleneare usually also present in small concentration. A powerful odorant, It is generally accepted that the emission form a LPG pored vehicle are less than those from the unleaded petrol (ULP) fuelled equivalent.

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LPG engines can have more power and torque and similar economy when Fig: 1 across a wide range of applications. Various tests where compared with an equivalent petrol engine. LPG flow is regulated to ensure smooth operation and will typically only deliver LPG under power. (ref. Fig -1)

Advantages and drawbacks

a) Advantages of LPG

- Because LPG vaporizes when released from the tank and is not water soluble, LPG does not pollute underground water sources.
- Power, acceleration, payload and cruise speed are comparable to those of an equivalent vehicle fueled on gasoline. Propane has a high octane rating of 104, in-between Compressed Natural Gas (CNG) and regular unleaded gasoline.
- Refueling a propane vehicle is similar to filling a gas grill tank; the time it takes is comparable with that needed to fill a CNG, gasoline or diesel fuel tank.
- Its high octane rating enables it to mix better with air and to burn more completely than does gasoline, generating less carbon. With less carbon buildup, spark plugs often last longer and oil changes are needed less frequently.

b) Drawbacks of LPG

- In cold conditions, below 32 degrees Fahrenheit, starting could be a problem because of the low vapor pressure of propane at low temperatures.

- One gallon of LPG contains less energy than a gallon of gasoline. The driving range of a propane vehicle is about 14 percent lower than a comparable gasoline-powered vehicle.
- LPG is generally higher priced than other fuel alternatives such as CNG and gasoline.
- There are over 4,000 LPG refueling sites in the US, more than all of the other alternative fuels combined. Most of these stations, however, are not readily available to consumers on a 24/7 basis. This is one of the reasons why most on-road applications are bi-fuel vehicles, which burn LPG and gasoline.

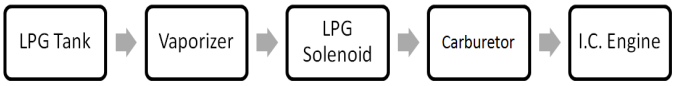

Figure 1. LPG Flow Diagram

Engine conversion

The process of converting a vehicle to run on propane is fairly challenging and requires a good knowledge of automotive systems in general to accomplish. Although propane is very safe as an automotive fuel, if the system is not installed correctly, there can be safety problems. With consulting to Mechanic installation procedure has been done.

Gas Tank

The first step is choosing a tank. Most of LPG tanks won't require replacing old fuel system. As a result, the propane tank will take up some of the space in the vehicle. Tanks come in "torpedo" or "donut" form. Torpedo tanks generally have more capacity.

Figure 2. LPG Storage Tank

Pipe Lining

Once the tank is bolted in, a fill point must be drilled into the vehicle's body, usually near the gasoline fill point. The ideal location is one that requires minimal piping to connect to the tank. The fuel lines themselves are copper tubes, which offer a certain amount of flexibility when the lines are routed. The tank must be connected to the fill point, and lines also have to run along the underside of the vehicle up to the engine.

Figure 3. Copper Piping to Carburetor

Replacement/Alteration of Air Filter

As there are only two inlets at carburetor, on for petrol and other of air. As the space available was limited, so alteration of air filter was done. Alteration process includes cutting of air filter and placing Vacuum Tube at outlet of air filter unit.

Figure 4. Alteration of Air Filter

Solenoid valve

A solenoid valve (LPG valve in the above diagram) must be installed on the fuel line in between the tank and the engine. This valve cuts the flow of LPG when the vehicle is running

on gasoline and when the engine is shut off. It also has a filter built in that removes any dirt that may be in the fuel.

Figure 5. Solenoid Valves

Regulator

The next major component is called a regulator, also referred to as a vaporizer. This device performs one of the functions that a carburetor handles in a gasoline engine -- it uses heat from the vehicle's cooling fluids to vaporize the propane into gas form. Another safety check occurs at the regulator, as well. It includes an electronic circuit that cuts the flow of gas if the engine stops or stalls. The other part of a carburetor's function is handled by a mixer mounted in the intake manifold.

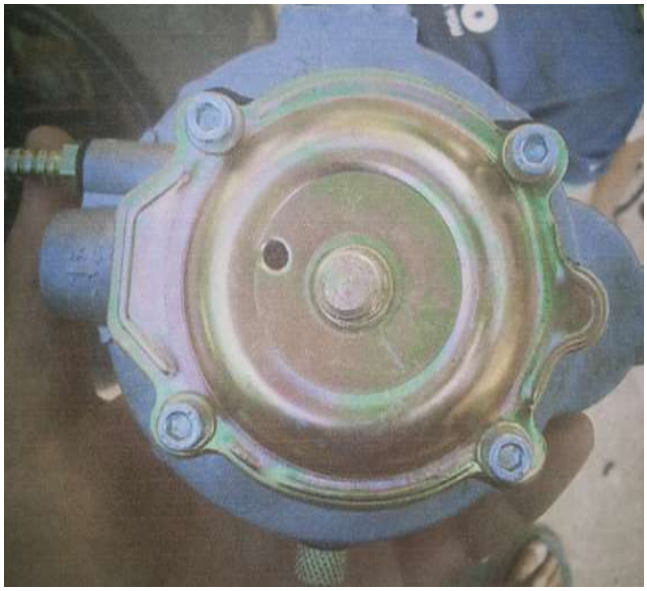

Figure 6. Vaporizer / Regulator

Electrical System

The system must then be wired into the vehicles electrical system, allowing easy switching in fuels with the help of solenoid valves, which helps for proper automatic switching between propane and gasoline (along with a dashboard-mounted manual switch). There must be connections to the vehicle's battery so that the engine controller can adjust for different fuel settings. Also Relays are used by which to control a circuit by a low power signal.

Figure 7. Circuit Connections

Figure 8. Switches

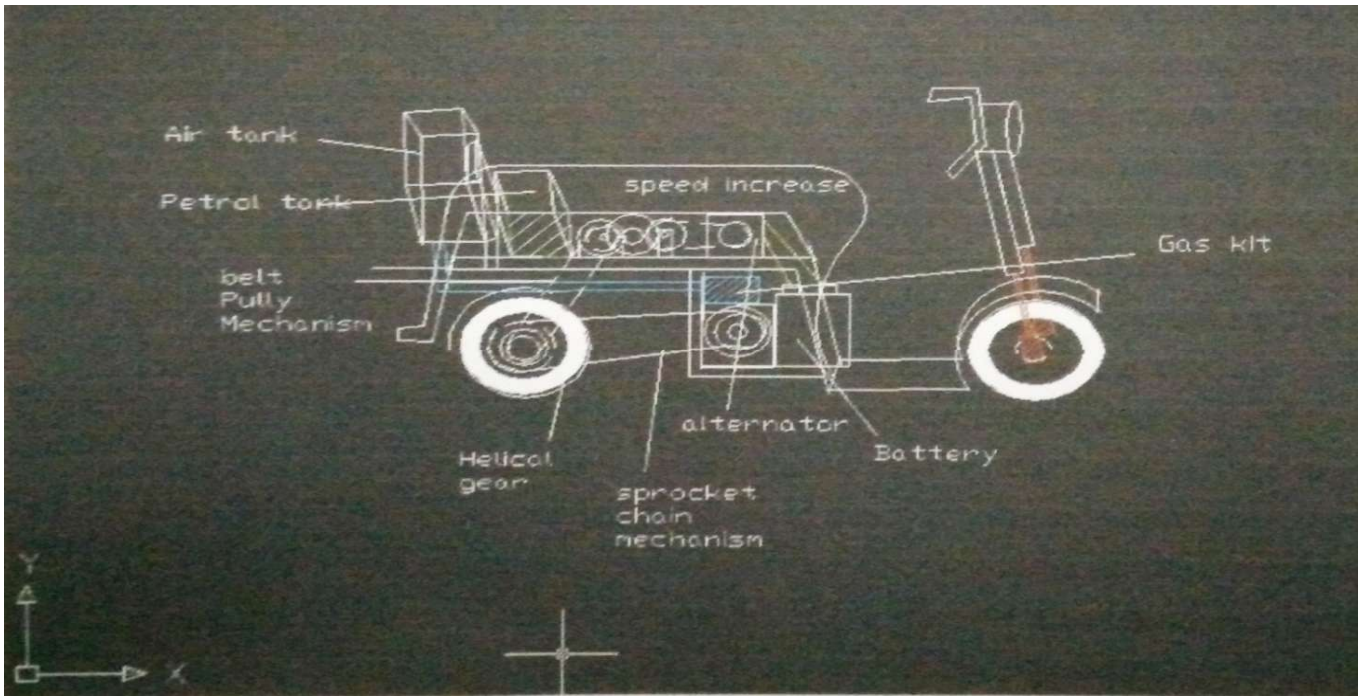

Figure 9. Proposed Design (On AutoCAD)

Figure 10. Actual Vehicle

Test results

- Distance covered by 1 liter of Petrol = 20 Km
- Distance covered by 1 liter of LPG = 23 Km

Conclusion

From the above result it is seen that vehicle has covered more distance when LPG is used as fuel in the vehicle. So LPG is more efficient than petrol. When test were conducted the emission from the vehicle were less for LPG compared to petrol hence LPG is more ecofriendly compared to petrol.

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