

“Experimental Investigation of Dual Fuel Bike Powered by Petrol and LPG Alternatively”

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Abstract - Now a day cheap & convenient fuel is the basic requirement to fulfill various purposes, but due to rapid increase in fuel costs and limited sources it could get more tuff day by day. Basically we need an alternative fuel which is cheap & reliable in comparison with gasoline. In this research paper an experimental setup has been created to compare the dual fuel to the conventional fuel. In this investigation LPG is used as another fuel for an internal combustion engine of capacity 97 cubic centimeters. For lower speed vehicle, L.P.G is suitable however gasoline is appropriate for higher speed operations. In this experimental setup two different fuels are used and try to reduce per kilometer running cost as well as finding an alternative fuel that makes a vehicle economical and efficient as compared to previous condition with conventional fuel and less emission are produced.

Key Words: LPG, gasoline, dual fuel bike, 4-stroke ignition engine, Alternative fuel mode, Efficiency & performance.

1. INTRODUCTION

The use of frothy fuels, i.e., liquefied fossil fuel Gas (LPG) for associate degree automotive application has been undertaken in different elements of the planet for variable reasons. The Committee has reviewed the worldwide situation, especially, the status of the CNG and LPG vehicle development programs have haunted in varied countries. The Committee has taken note of the continuing efforts for promoting the utilization of those different fuels within the country. In India, LPG is that the primary mastic fuel in urban areas. The autochthonic handiness of LPG is predicted to fall abundant short of the house demand alone. In and of itself none of these mentioned higher than conditions that created LPG a competitive car fuel in different countries, exist. For these reasons, LPG goes to be competitive as associate degree car fuel, in India Government support would be would like by method of considerably lower taxation. The idea behind this project generated by perceptive the LPG operated I.C. engine car. Constant gas aspirated engine can be wont to drive the two-wheel vehicle. From LPG cylinder the gas is equipped for burning the gas within the engine cylinder. The separate GAS KIT we tend to area unit aiming to install on Bike to feed the metered quantity of gas mixed with the air to the engine cylinder, finally, through the mechanical device.

2. LITERATUTRE REVIEW

Thirumal mamidi¹, Dr. J.G. Suryawnsi² Jan-Feb 2012, Gaseous fuels such as liquefied petroleum gas (LPG) and liquefied natural gas (LNG) have been widely used in commercial vehicles. This project evaluated an experimental investigation on Liquefied Petroleum Gas (LPG) as an alternative fuel for four-stroke spark ignition engine. The primary objective of the study was to determine the performance and the exhaust emissions of the engine using different fuels.[1]

Hemant Singh , Chandan Kumar , Angad Kumar Yadav¹ , Ajay Kumar Verma , Dileep Kumar Yadav , Akhilesh Nishad , Mr. Alok Kumar Pandey April (2015).An attempt has been made in this project to use alternative fuel in four stroke engines 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 economic considerations and engine efficiency. In our project, we have installed LPG fuel system to four stroke vehicles wherein we can use both gasoline and LPG. The alternations made to install LPG in the vehicle are discussed.[2]

Samarendra Singh, Sarthak Singh, Sharaj Kant, Saurav Khari 2018.The essential target of the investigation was to determine the performance and the fumes emanations of the motor utilizing distinctive fuel. The motor utilized as a part of the examination was initially a single cylinder; four-stroke start motor and minor alterations were done to allow the trials to keep running on CNG fuel. Amid the running, the engine was coupled to a ropeway dynamometer to quantify a few motor execution parameters and a gas analyzer were embedded into the motor fumes tailpipe for estimating the fumes emanations.[3]

Thirumal mamidi, Dr. J.G. Suryawnsi Jan-Feb 2012. Gaseous fuels such as liquefied petroleum gas (LPG) and liquefied natural gas (LNG) has been widely used in commercial vehicles. This project evaluated and experimental investigation on liquefied petroleum gas (LPG) as an alternative fuel for four stroke spark ignition engines. The primary objective of the study was to

determine the performance and the exhaust emissions of the engine using different fuels. [4]

M. Faizala,b, M. H. Hamzahb, A. Navaretsnasinggam January 2009 . Use of alternative fuels in I C engine shows favorable impact in reduction of air pollution and also in the economy of the country. LPG, CNG etc. are easily available alternative fuels which can be used in I C engine with proper modification of the engine. Though LPG is most commonly used in S I engine of the small vehicles by complete replacement, it can be used in C I engine too. [5]

Tongchit Suthisripok, Nachaphat Phusakol and Nuttapol Sawetkittirut June 2017.Bi-fuel-Gasoline/LPG system has been effectively and efficiently used in gasoline vehicles with less pollutant's emission. The motorcycle tested was a used Honda Air Blade i110- fuel injection type. A 3-litre LPG storage tank, an electronic fuel control unit, a 1-mm LPG injector and a regulator were securely installed. The converted motorcycle can be started with either gasoline or LPG. The safety relief valve was set below 48 KPa and over 110 KPa. The motorcycle was tuned at the relative rich air-fuel ratio of 0.85-0.90 to attain the best power output. [6]

Rajpal Dhakar, Ajay Tripathi, Janmit Raj August-2016.The conventional petroleum fuel is exhausting at a very fast rate. The diesel in CI engine and gasoline in SI engine are used as fuel. The exhaust of these fuels' causes serves environmental pollution as they release harmful gases like CO, CO₂, HC, NO_x and smoke emissions into the atmosphere. [7]

Syed Kaleemuddin and G. Amba Prasad Rao, 2009.The present study reports the experimental investigations carried and up gradation of 395 CC air cooled engine to dual fuel (CNG/Gasoline) application. The original 395 CC direct injection naturally aspirated, air cooled diesel engine was first converted to run on Gasoline by addition of electronic ignition system and reduction in compression ratio to suit both gasoline and CNG application. [8]

Abhisheak Gangwar, Ashutosh Tiwari, Vinay Keshari Sep-2017. Lots of them have two stroke and four stroke engines and they use petrol and diesel as a fuel. The use of petrol and diesel is totally responsible for global warming because the quality of fuel is very low. CNG uses as alternate fuel in four wheelers so with some modifications CNG can use a fuel in two wheelers. Natural gas has many special properties and some specification. [9]

Aman Sharma, November 2017 .The idea of this project comes when we see the only one option available as a fuel in bikes/scooter. So, in this project the design, implementation and fabrication of such a system is done which runs on dual fuel i.e. Petrol and L.P.G. The intension is to explore the possibility of creating a bike which can run smoothly on LPG for longer trips/journey and lower

load while still having the capability of switching on petrol for longer as well as shorter trips but at higher loads. [10]

A dual fuel engine (hydrogen and petrol vehicle) is an alternative fuel vehicle that uses hydrogen and petrol as its onboard fuel for motive power. The term may refer to a personal transportation vehicle, such as an automobile, or any other vehicle that uses hydrogen and petrol in a similar fashion, such as an aircraft. [11]

S.Mohanavelu,C.Thamotharan, P.Naveen chandran, C.Jagadeesh Vikram, 2018. CNG's can likewise be effectively refueled from any of the current service stations. CNG bicycle are said to be more secure than LPG bicycle likewise on the grounds that LPG is exceptionally ignitable while CNG is light in property and disseminates effortlessly into the air. [12]

3. SPECIFICATION & ASSEMBLY OF LPG KIT

The bike used in this experiment has the following specification-

Engine displacement	97.2 cc
Engine type	Air cooled, 4 strokes
Number of cylinders	1
Valves per cylinder	2

Max power	7.5 Bhp @ 8000 rpm
Max torque	7.95 Nm @ 5000 rpm
Bore x stroke	50mm49.50mm
Fuel type	PETROL
Starter	KICK

TRANSMISSION

Transmission type	Manual
Number of speed	Gears 4
Final drive (rear wheel)	Chain

SUSPENSION

Front suspension	Telescopic hydraulic shock absorbers
Rear suspension	Swing Arm with Adjustable Hydraulic Shock Absorbers

BRAKES

Front brake	130mm DRUM
Rear brake	130mm DRUM

DIMENSION

Overall length	1980.00 MM
Overall width	720.00 MM
Overall height	1060.00 MM
Wheelbase	1235.00 MM
Ground clearance	159.00 mm
Kerb weight	116.00kg 12.80 liters
Fuel capacity	12.80 liters

4. Major elements of LPG Kit used-

a. Gas cylinder arrangement



Fig. No. 1 Gas cylinder arrangement

b. Vaporizer



Fig. No.2 Vaporizer

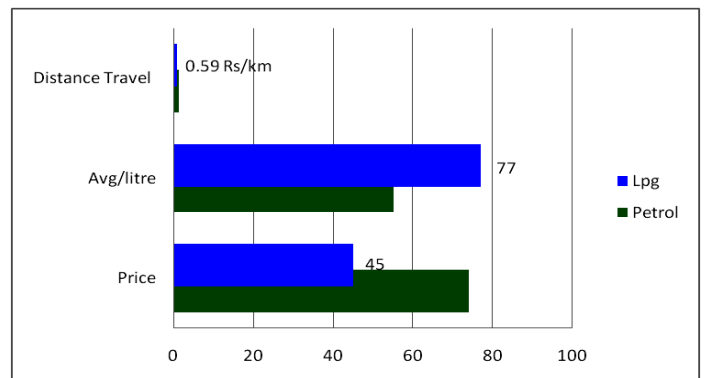
c. Hose pipe



Fig.No.3 Hose pipe

5. FUEL COMBUSTION DETAIL

Fuel	Price	Avg. / litre.	Distance Travel
Petrol	74	50-60	1.23 Rs/km
Lpg	45	70-85	0.59 Rs/km



Graph No.1 Comparison chart LPG and Petrol

6. CONCLUSION

In this experimental investigation it has to be found that LPG as an alternate fuel of petrol is much cheaper than petrol and per km running cost reduces and works efficiently.

Advantages-

- a) Low running value.
- b) Decrease in maintenance
- c) Low Emissions.
- d) Increase during a total run of the bike in one refill.
- e) Increase in engine life.
- f) Less wear and tear within the piston cylinder.

Cold beginning Improves

Limitations-

- a) Less LPG refueling stations.
- b) Rural areas don't have Natural gas filling stations.
- c) Small LPG tank.
- d) Cost for conversion of the bike is high.

Daily Usage of motorcycle offers the subsequent result:

- a) For daily usage, a standard person rides a motorbike for 50km.
- b) Recent value of Petrol=74 Rs/ltr. And LPG=44 Rs/ ltr.
- c) Traditional mileage of 100cc, for Petrol-50 km/ ltr, LPG-80 km/ ltr. (Theoretically)
- d) Shrewd monthly running value (for daily 60 km)
- e) LPG – Rs 1800

REFERNCES:

- [1] International Journal of Recent Research in Civil and Mechanical Engineering (IJRRCME) Vol. 2, Issue 1, pp: (3-8), Month: April 2015 – September 2015, Available at: www.paperpublications.org
- [2] International Journal of Mechanical Engineering and Technology (IJMET), ISSN 0976 – 6340(Print), ISSN 0976 – 6359(Online), Volume 6, Issue 4, April (2015), pp. 65-71© IAEME
- [3] Singh Samarendra et.al; International Journal of Advance Research, Ideas and Innovations in Technology ISSN: 2454-132X Impact factor: 4.295 (Volume 4, Issue 3) Available online at: www.ijariit.com
- [4] IJSRD - International Journal for Scientific Research & Development| Vol. 3, Issue 02, 2015 | ISSN (online): 2321-0613
- [5] International Journal of Engineering Trends and Technology (IJETT) – Volume 39 Number 1- September 2016
- [6] 5th Asia Conference on Mechanical and Materials Engineering (ACMME 2017) IOP Publishing IOP Conf. Series: Materials Science and Engineering 241 (2017) 012021 doi:10.1088/1757-899X/241/1/012021
- [7] August 2016, Volume 3, Issue 8 JETIR (ISSN-2349-5162)
- [8] American Journal of Applied Sciences 6 (5): 929-936, 2009 ISSN 1546-9239 © 2009 Science Publications.
- [9] International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 04 Issue: 09 | Sep -2017 www.irjet.net p-ISSN: 2395-0072
- [10] International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391
- [11] International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887 Volume 5 Issue VII, July 2017- Available at www.ijraset.com
- [12] International Journal of Pure and Applied Mathematics Volume 119 No. 12 2018, 10223-10230 ISSN: 1314-3395 (on-line version) url: <http://www.ijppam.eu>
- [13] K. Mohan Kumar Int. Journal of Engineering Research and Applications www.ijera.com ISSN: 2248-9622, Vol. 4, Issue 11(Version 2), November 2014, pp.41-53
- [14] International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering An ISO 3297: 2007 Certified Organization Vol. 4, Special Issue 1, March 2015 National Conference on Recent Advances in Electrical & Electronics Engineering (NCREEE 2015)
- [15] International Journal of Innovative Research in Science, Engineering and Technology (A High Impact Factor, Monthly, Peer Reviewed Journal) Visit: www.ijirset.com Vol. 7, Issue 9, September 2018
- [16] International Journal of Engineering and Innovative Technology (IJEIT) Volume 2, Issue 1, July 2012 ISSN: 2277-3754 ISO 9001:2008 Certified
- [17] International Journal of Advanced Technology in Engineering and Science www.ijates.com Volume No.02, Special Issue No. 01, September 2014 ISSN (online): 2348 – 7550.
- [18] International Journal of Modern Engineering Research (IJMER) www.ijmer.com Vol.2, Issue.6, Nov-Dec. 2012 pp-4629-4633 ISSN: 2249-664