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A Review on Alternative Fuels for Internal Combustion Engine

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Abstract – Quick consumations of petroleum derivatives and their hindering impact to the earth is requesting an earnest need of alternative fuels for fulfilling reasonable vitality need with least ecological effect. This circumstance makes individuals to concentrate on practical vitality asses for their survival. Elective powers are perceived to be the significant potentiels hot spot for vitality generation. A great deal of research is being conveyed all through the world to assess the execution, fumes emanation and ignition attributes of the current motors utilizing a few alternative fuels. There are scopes of elective powers use advances that produce valuable vitality. This paper reviews for alternative fules used in internal combustion engines.

Keywords – Alternative Fuels, Biodiesel, Biogas, Compression Ignition Engine, Spark Ignition Engine.

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1. INTRODUCTION

Alternative fuel can be defined as any material or substance, other than petroleum, which is consumed to provide energy to power an engine. In other words it can be define as a fuel which can be reproduced or refilled. It is observed that in the last decade the production of oil will no longer supply the demand for energy. It is therefore required for new or different technologies which can replace the non-renewable fuel or called petroleum fuel.

2. ALTERNATIVE FUEL FOR SPARK IGNITION ENGINES

M.V. Mallikarjun (2009) in present work an experimental attempt has been made to know the level of variation of exhaust emissions (Carbon monoxide, Hydrocarbons, Nitrusoxides) in S.I. four cylinder engine by adding methanol in various percentages in gasoline and also by doing slight modifications with the various subsystems of the engine under different load conditions. For various percentages of methanol blends (0-15%) pertaining to performance of engine. It is observed that there is an increase of octane rating of gasoline along with increase in brake thermal efficiency, indicated thermal efficiency and reduction in knocking.

F. Moreno et al.(2010) has investigated experimentally by aiming the analysis of modification in spark ignition engine fuelled with hydrogen and methane blend in the large range of operation conditions. At the time of investigation project disposes of an original SI engine fuelled by gasoline totally modified to operate with hydrogen-methane blends as fuel and it's possible to measure the basic performance as well as other interesting characteristics as indicated diagram, pollutant emissions, new ignition programs, EGR flow, etc. They also designed a gaseous fuel supply system, which includes measuring, control and safety systems. Now a days, this fuel supply system is in a building phase.

N. Seshaiah et al. (2010) in the present work, the variable compression ratio for spark ignition engine designed to run on gasoline has been tested with pure gasoline, LPG (Isobutene), and gasoline blended with ethanol 10%, 15%, 25% and 35% by volume. The gasoline mixed with kerosene at 15%, 25% and 35% by volume without any engine modifications has been tested. The results are presented and compered the variation of the brake thermal and volumetric efficiency with brake load A compression have been also made CO and CO2 emissions for all tested fuels.

Amitesh Paul et al. (2011) in present work an experimental has been carried out by taking the main objective is to analyze performance of ethanol blended with gasoline fuelled engine and find out

the best blend for all loads. The parameters, such as fuel consumption rate, brake specific fuel consumption, volumetric efficiency, brake thermal efficiency, mechanical efficiency were estimated using the standard equations. Their experimental results shows that 20% ethanol blend with gasoline gives the best performance for both MPFI as well as the Carburetor SI engine. Optimum value of ethanol can be varied to check for better performance analysis.

Suraj Bhan Singh et al. (2015) In this study, engine performance, emissions and combustion characteristics of butanol-gasoline blends via baseline gasoline were experimentally evaluated in a medium duty SI engine without any hardware modifications at various engine speeds and loads. It is conluded that to very small difference in engine performance, emissions and combustion characteristics, butanol blends can be used as a partial replacement of gasoline, without any significant hardware modifications or sacrifice in engine performance in the existing transportation engines.

3. ALTERNATIVE FUEL FOR COMPRESSION IGNITION ENGINES

R.Prakash et al. (2011)Experimental studies were carried out in a single cylinder, four stroke, air cooled, and DI diesel engine with three fuels that were WPO diesel emulsion, WPO diesel emulsions with addition of 2% and 4% DEE. The results were compared with the diesel fuel data and analysed. The experimental results shows that the brake thermal efficiency is found to be higher by 6.34, 9.5 and 9.3 percentages for WPO diesel emulsion, WPO diesel emulsions with 2% and 4% DEE respectively when compared with diesel fuel at full load. The percentage reduction in NO emissions of about 19.21, 28.38 and 34.81 were noticed for the above said fuels.

Agung Sudrajad et al. (2011) the present study is attempt to optimization of using blend Fatty Acid Methyl Ester (FAME) on diesel engine by experimentally. The investigation experimental project shows the comparison between using blend FAME and base diesel fuel. The engine experiment is conducted with YANMAR TF120M single cylinder four stroke diesel engine set-up at variable engine speed with constant load. It is concluded that measurement of emissions parameters at difference engine speed conditions have generally indicated lower in emission NOx, but slightly higher on CO2 emission. The result also shown that the blends FAME are good in fuel consumption and potentially good substitute fuels for diesel engine.

R. C. Singh et al. (2012), An experimental study has been carried out to investigate the performance of a single cylinder air cooled diesel engine fuelled with neem oil-diesel blend (5%, 10%, 15% and 20% by volume) and the results are compared with baseline data of diesel. The results shows that Brake thermal efficiency of the engine with 5% neem oil blend was found to be marginally higher than neat diesel operation at all loads indicating better combustion due to dissolved oxygen. However, with further increase in percentage of neem oil, brake thermal efficiency of the engine reduced significantly at higher loads possibly due to increased viscosity of the fuel impinging proper combustion. Based on this experimental study, it is envisaged that in rural/agriculture sector of India where neem oil can be available at economical cost, 5% neem oil blend may be a good substitute for mineral diesel which in turn can save considerable amount of forex outflow for equivalent crude oil import.

Dinesha Pet al. (2012) In the present work, an experimental investigation is carried out on a four stroke single cylinder CI engine to find out the performance and emission characteristics with preheated B40 blend of pongamia biodiesel and B20 biodiesel. The B40 blend is preheated at 60, 75, 90 and 110°C temperature using waste exhaust gas heat in a shell and tube heat exchanger. Analysis shows a significant improvement in performance and emission characteristics of preheated B40 blend is obtained. B40 blend preheated to 110°C showed maximum 8.97% increase in brake thermal efficiency over B20 blend at 75% load. Thus it is concluded that preheating of higher biodiesel blend at higher temperature improves the viscosity and other properties sharply and improves the performance and emission.

Dipak Patil et al.(2012) In the present work, Jatropha Biodiesel is used as a fuel and their important physical & chemical properties were tested & compared. It is found that these properties are approximately similar to diesel fuel and suitable to use in diesel engine. Also petro-diesel is used before and after the biodiesels for verifying the engine condition due to biodiesels. The performance characteristics of an engine are studied with different proportions of biodiesel and petro-diesel .The power, torque, and brake thermal efficiency using biodiesel are found higher at various load conditions than the petro-diesel; however specific fuel consumption is found slightly more. The biodiesel blend JBD20 have shown better performance than the diesel and other blends.

M.Ravi (2013), In this work the experiments are conducted at varied injection pressures using two types of piston geometry. These experiments are conducted using Diesel, Palm Stearin Methyl Ester and Animal Tallow Methyl Ester to evaluate engine performance, emissions and combustion characteristics of CI diesel engine. By performing the experiments it has been found that

performance, Emissions of Palm Stearin Methyl Ester (PSME) and Animal Tallow Methyl Ester (ATME) for both Hemispherical and Flat bowl piston at injection pressure of 240 bar is superior when compared with normal standard diesel. The HC and NOX emissions for PSME and ATME at injection pressure of 180 and 220 bar are superior when compared with diesel. The in-cylinder pressure for ATME for Hemispherical bowl piston at injection pressure of 220 bar is higher compared to diesel. The experimental results also prove that Palm Stearin Methyl Ester (PSME) and Animal Tallow Methyl Ester (ATME) at injection pressure of 240 bar are best alternative fuels for diesel engine.

D. K. Ramesha et al. (2013) in presents works the investigation is carried out in studying the properties and behavior of methyl esters of corn seed oil, fish oil and its blends with diesel fuel in a CI Engine. Engine tests have been carried out to determine the performance, emission and combustion characteristics of the above mentioned fuels. The tests have been carried out in a 4-stroke, computerized, single cylinder, constant speed, direct injection diesel engine at different loads. The results showed that the properties of the above mentioned oils are comparable with conventional diesel. The 20% blend performed well in running a diesel engine at a constant speed of 1500 rpm. It substantially reduced the emissions with acceptable efficiency. Hence the oils can be used as suitable additives for diesel in compression ignition engine.

Kumbhar et al. (2014) the main objective of the present investigation was to evaluate the suitability of Thumba biodiesel blend in terms of engine performance and emissions. The performance tests were conducted with diesel, and blends of Thumba at different compression ratios. From the experimental results obtained, Thumba oil blends are found to be a promising alternative fuel for compression ignition engines. It shows that the blends of B10% and B20% have superior emission characteristics than other blends and closer to diesel values.

Dr. Hiregoudar Yerrennagoudaru et al. (2014) The present investigation evaluates Biofuel (30% ethanol + 70% linseed oil) as a C I engine fuel. The objectives of this research is to analyze the fuel consumption and the emission characteristic of a twin cylinder diesel engine that are using Biofuel & compared to usage of ordinary diesel that are available in the market. Based on the performance and emissions of Bio fuel, it is concluded that the bio fuel oil represents a good alternative fuel with closer performance and better emission characteristics to that of a diesel.

4. CONCLUSION

Based on the above literature review, the following conclusion are drawn

1. Use of renewable fuel is also playing an effective role in performance of Spark ignition engine with slightly modification of engine.

2. Using the renewable fuel in proper composition can replace conventional fuel.

3. Although numerous research is going to replace the conventional fuel with biofuels but still a suitable proportion is not found which completely replace the conventional fuel.

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