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Technical Paper Presentation on
An Experimental Investigation of Diesel Engine Using Gasoline as Additive A Review

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Abstract: In this project experiment is to be carried out on diesel engine for gasoline-diesel mixture in which gasoline is used as a fuel additive. The effect on the properties on the diesel for 0% 5%, 10% and 15% (by volume) gasoline mixed directly to diesel has to be looked up than the experiment is done on diesel engine at constant rpm. The effect on the power output, efficiency and fuel consumption after addition of gasoline is measured. The effect on the emissions like HC, CO, NOx and soot is measured. The analysis of performance of the engine and exhaust emissions is carried out at different load condition.

Key points: Experiment, diesel engine, gasoline, fuel additive.

1.0 INTRODUCTION

1.1 General Information

An internal combustion engine (ICE) is the heat engine where the combustion of a fuel happens with oxygen (often air) in a combustion chamber that's an imperative part of the working fluid. In an internal combustion engine, the expansion of the high-temperature and excessive-pressure gases produced by using combustion observe direct drive to a couple factor of the engine. This force strikes the component over a distance, remodeling chemical vigor into useful mechanical power. The first commercially effective internal combustion engine was created by Etienne Lenoir around 1859 and the first today's internal combustion engine was once created in 1864 by Siegfried Marcus.

The term internal combustion engine more commonly refers to an engine in which combustion is intermittent, such because the more acquainted 4-stroke and two-stroke piston engines, together with variations, such as the six-stroke piston engine and the Wankel rotary engine. A second type of internal combustion engines use steady combustion: gas mills, jet engines and most rocket engines, each of which can be internal combustion engines on the equal principle as beforehand described. Firearms are also a form of internal combustion engine.

Internal combustion engines are quite specific from external combustion engines, comparable to steam or Sterling engines, where the energy is delivered to a working fluid not including, combined with, or contaminated through combustion merchandise.. At the same time there are a lot of stationary functions, most ICEs are used in cell functions and are the dominant provide for autos reminiscent of cars, aircraft, and boats.

Usually an IC ENGINE is fed with fossil fuels like normal gas or petroleum products such as gas, diesel fuel or fuel oil. There may be a growing usage of renewable fuels like biodiesel for compression ignition engines and bioethanol for spark ignition engines. Hydrogen is generally used, and can also be made from either fossil fuels or renewable energy.

1.2 Classification of IC Engine:

- Diesel engine (Compression-ignition engine)
- Petrol engine (Spark-ignition engine)

Diesel Engine:

The diesel engine is an internal combustion engine wherein ignition of the fuel that has been injected into the combustion chamber is initiated by the high temperature which a gasoline achieves when commonly compressed (adiabatic compression). This contrasts with spark-ignition engines comparable to a petrol engine or fuel engine, which use a spark plug to ignite an air-gas combo.

The diesel engine has the highest thermal efficiency (engine effectively) of any realistic internal or external combustion engine because of its very excessive compression ratio and inherent lean burn which makes it possible for warmness dissipation by using the surplus air. A small efficiency loss is also refrained from in comparison with two-stroke non-direct-injection fuel engines considering that unburnt gas is not reward at valve overlap and therefore no gas goes immediately from the intake/injection to the exhaust. Low-velocity diesel engines can have a thermal efficiency that exceeds 50%.

Petrol Engine:

The time period spark-ignition engine refers to internal combustion engines, more commonly petrol engines, the place the combustion process of the air-gas combo is ignited by way of a spark from as that is in contrast to compression-ignition engine quite often diesel engines where heat generated from compression along with the injection of gasoline is adequate to initiate the combustion system, without needing any outside spark-ignition engines are regularly known as "gas engines" in the united states, and "petrol engines" in Britain and the leisure of the sector. However, these phrases will not be favored, seeing that spark-ignition engines can (and increasingly are) run on fuels other than petrol/gasoline, comparable to LPG, methanol, ethanol, compressed common gas(CNG), hydrogen and (in drag racing) nitro methane.

A four-stroke spark-ignition engine is an Otto cycle engine. It includes following four strokes: suction or consumption stroke, compression stroke, growth or energy stroke, exhaust stroke. Each stroke contains one hundred eighty degree rotation of crankshaft rotation and accordingly a four-stroke cycle is accomplished via 720 degree of crank rotation.

2.0 SUBMISSION OF TECHNICAL PAPERS

1. **S.Manibharathi, B.Annadurai, R.Chandraprakash-** This experiment is study of different three types of fuel in diesel engine. Diesel, biodiesel and biodiesel with rhodium oxide are taken as fuel in diesel engine one by one. And find the result of diesel engine. After getting result compare with each other. And find the best fuel. In this experiment they are find the brake thermal efficiency, NOx emission, CO emission, HC emission for each fuel. And compare with each other help of chart.

2. **Vivekpathak, Prof. Amitesh Paul-** This research presents effect of triacetin and ethanol as additive to biodiesel (Neem oil methyl ester) on the performance and emission characteristics of a diesel engine at different loads and constant engine speed. In this paper they are find the NOx emission, CO emission, HC emission and smoke generation for BD-1(5% triacetin,95% biodiesel), BD-2(10% triacetin,90% biodiesel) , BE-1(5% ethanol, 95% biodiesels) and BE-2 (10% ethanol ,90% biodiesel) , diesel.

3. **R. Senthil Kumar, R. Manimaran and V. Gopalakrishnan-**Ethanol is a bio-based renewable and oxygenated fuel, thereby providing potential to reduce the emission in diesel engine and to provide reduction in life cycle of

carbon di-oxide. So that reduces ozone layer depletion. The present work has been carried out using single cylinder, four stroke, water cooled diesel engine. In this phase, experiment investigations are conducted using five sets of blended fuels i.e 10%, 15%, 20%, 25%, 30% Ethanol – Diesel blend have been prepared and preheating the inlet air to 40ºC, 50ºC and 60ºC. The performance and emission characteristics are studied and compared with the base fuel.

4. **S.Kirankumar**-the experimental investigations carried on a four stroke single cylinder water cooled Kirloskar diesel engine with Cotton seed oil-diesel blends. Cotton seed oil is blended with diesel in varying proportions like (C10, C20, C3) 10%, 20% and 30% and experiments were carried out by varying the injection pressures from 165 bar to 210 bar. The performance characteristics like brake thermal efficiency, brake specific fuel consumption and exhaust gas temperatures are investigated. Based on investigations, a comparison is drawn on engine performance with pure diesel operation and with different blends.

5. **Y.V.Hanumantha Rao, Ram SudheerVoleti ,A.V.SitaramaRaju and P.Nageswara Reddy-**The performance of single cylinder water-cooled diesel engine using Multi-DM-32 diesel additive and methyl-ester of Jatropha oil as the fuel was evaluated for its performance and exhaust emissions. Three blends were obtained by mixing diesel and esterified Jatropha in the following proportions by volume: 75% diesel+25% esterified Jatropha, 50% diesel+50% esterified Jatropha and 25% diesel+ 75% esterified Jatropha. Also 0.4 ml/L Multi-DM-32 additive is added to methyl ester of Jatropha to study the performance and exhaust emissions of diesel engine. Performance parameters like brake thermal efficiency, specific fuel consumption, brake power were determined. Exhaust emissions like CO2, CO, NOX and smoke have been evaluated.

6. **Swarup Kumar Nayak, SibakantaSahu, SaipadSahu, Pallavi Chaudhry-** In the present work Karanja oil is used as a source for biodiesel production via base catalyzed transesterification and biodiesel produced in the process is mixed with an additive (Dimethyl Carbonate) in varying volume proportions to prepare a number of test fuels for engine application. Experiments were carried out on a four stroke single cylinder constant speed direct injection diesel engine under varying load condition to investigate about the performance and emission characteristics of the engine fuelled with the present test fuels.

7. **Vivek Singh Shekhawat, Ravi Shankar Padwa-** In this review paperthere is a comparative study to find out the alternative for dieselfuel and efforts to increase its performance. In this paperblending of oxygenated additive at different percentage with sole diesel and effects on various performance parameters are studied. Blending of Oxygenated additives, improve brake specific fuel consumption (BSFC), combustion performance and reduce emission from diesel engine.

8. **Swarup Kumar Nayak ,BhabaniPrasannaPattanaik-** The experimental study was carried out to investigate the performance and emission characteristics of a direct injection diesel engine with Mahua oil methyl ester using additive and comparing it with that of diesel. B85, B90, B95, B100 and the diesel fuel are used as the test fuels where B85 represent 85% biodiesel and 15% additive. Similarly B90 and B95 represent 90% biodiesel with 10% additive and 95% biodiesel lwith 5% additive respectively. B100 represents pure biodiesel without additive.

9. **Anil Kumar Patil ,GodiganurSharanappa-** Experimental investigation of Isobutanol as an additive to the diesel- biodiesel blends. Experiments were done on a 4-Stroke single cylinder diesel engine by varying percentage by volume of Isobutanol in diesel-biodiesel blends. The effect of Isobutanol on brake thermal efficiency, brake specific fuel consumption, cylinder pressure, heat release and exhaust emissions were studied.

10. **V.Pirozfar1, A.Z.Moghadam1 S.sepehri1, M.R. Omidkhah1, A.Ameri1-** This study evaluates the effect of additives in diesel and of Additive-ethanol-diesel fuel blends on the properties of density, viscosity, Cetane number, flash point, Boiling point, distillation and performance in engine tests. An additive used to keep the blends homogenous and stable, and an Ignition improver, which can enhance Cetane number in ethanol-diesel fuel blends. The Formulations were carried out with 5, 7.5 and 10% v/v of Additive-ethanol starting from a base diesel.

3.0 ILLUSTRATION

3.1 Figures & Photographs

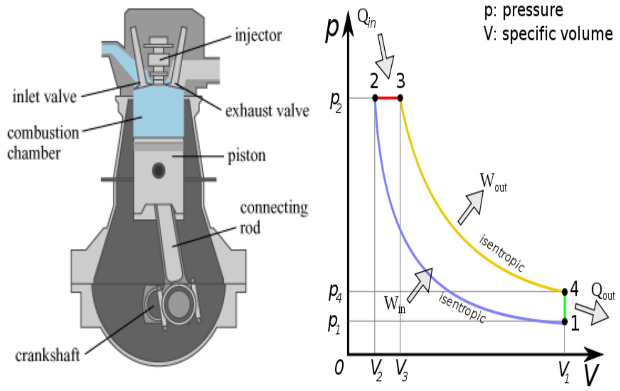

Fig. 1 P-V diagram of Diesel Engine

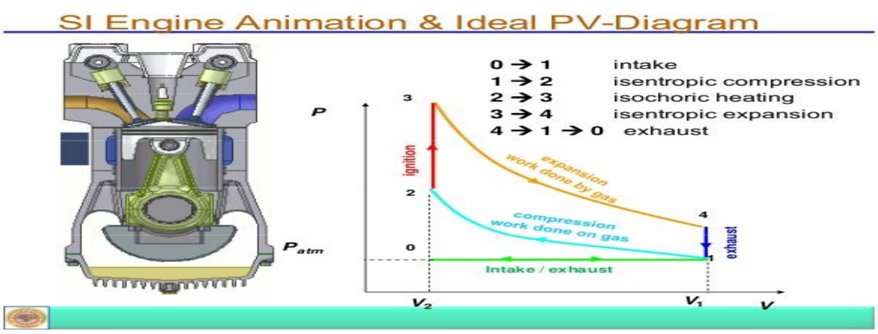

Fig. 2 P-V diagram of Petrol Engine

COMMANDER Diesel Engine

3.2 Tables

Table 1- Diesel Engine Specification

Power	10.4 Hp
Cooling	Air Cooled (Radial Cooled)
No. Of Cyl.	One
Fuel	High Speed Diesel
Type	Vertical ,4-Stroke, Compression Ignition
Injection	Direct By Multi-Hole Nozzel
Speed	1500 Rpm
Sp. Fuel Con.	250 G/K Wh
Fuel Tank	10 Liter
Rotation	Clockwise Looking At The Flywheel
Starting	Handle Start With Cranking
Governing	Class B1
BORE (Mm)	102.0
STROKE (Mm)	115.0
Dry Weight	160

Table 3 - Fuel Property

Property	Diesel	gasoline
Density	0.852	0.719
Viscosity (cSt)	1-3.7	0.46
Flash point temperature(°C)	62	43
Auto ignition temperature(°C)	210	246
(Cetane/Octane) number	40-55	-
Calorific value(kj/kg)	44215	47300
Carbon dioxide produce	161.3	157.2

5.0 REFERENCES

1. **Arcoumanis C, Bae C, Crookes R and Kinoshita E (2008),** "Experimental Investigation of CI Engine Performance by Nano Additive in Biofuel ", Fuel, Vol. 87, pp. 1014-1030.
2. Experimental Investigation of Performance & Emission Characteristics of Diesel Engine Working On Diesel and NOME with Ethanol and Triacetin Blends
3. Experimental investigation on D. I. diesel engine fuelled by ethanol diesel blend with varying inlet air temperature
4. Experimental Investigation On Performance, Combustion Characteristics Of Diesel Engine By Using Cotton Seed Oil
5. Experimental investigations on jatropha biodiesel and additive in diesel engine
6. Experimental Investigation On Performance And Emission Characteristics Of A Diesel Engine Fuelled With Karanja Oil Methyl Ester Using Additive
7. Role of Additives and their Influence on Performance of Engine for Petroleum Diesel Fuel, Oxygenated-Diesel Blend
8. Experimental Investigation on Performance and Emission Characteristics of a Diesel Engine Fuelled with Mahua Biodiesel Using Additive
9. Experimental Investigations Of Diesel Engine Using Fish Oil Biodiesel And Its Blends With Isobutanol As An Additive
10. Effect of additive-ethanol-diesel blend fuel on Physicochemical properties and emission
11. **. Chapman E M and BoehmanA L (2008),**" ", Fuel Process. Technol., Vol. 89, pp. 1262-1272.
12. **Derry L D, Dodds E M, Evans E B and Royle D (1954),** "The Effects of Auxiliary Fuels on Smokelimited Power Output of Diesel Engine", Proc. Inst. Mech. Eng., Vol. 168, pp. 280-286.
13. **Dunbeck P B and Reitz R D (2010),** "An Experimental Study of Dual Fueling with Gasoline Port Injection in a SingleCylinder, Air-Cooled HSDI Diesel Generator", in SAE Tech Paper, SAE (2010-01-0869).
14. **Durgun O (1990),** "Experimental Methods in Internal Combustion Engines", Karadeniz Technical University, Mechanical Engineering Department.
15. **Durgun O (1988),** "Using Ethanol in Spark Ignition Engine", Union Chambers Turkish Eng. Architects-Chambers Mech. Eng., Vol. 29, pp. 24-26.
16. **Durgun O and Ayvaz Y (1996),** "The Use of Diesel Fuel-Gasoline Blends in Diesel Engines", in Proceedings of the First Trabzon International Energy and Environmental Symposium, July 29-31, pp. 905-912, Turkey, Trabzon.
17. **Durgun O and Sahin Z (2009),** "Theoretical Investigation of Heat Balance in Direct Injection (DI) Diesel Engines for Neat Diesel Fuel and Gasoline Fumigation", Energy Convers. Manage., Vol. 50, pp. 43-51.
18. **Durgun O, Sahin Z and Bayram C (2009**), "Numerical and Experimental Investigation of the Effects of Light Fuel Fumigation and Mechanical Efficiency in Vehicle Diesel Engines", Turkey State Planning Organization, Project Report, 2003K120750.
19. **Holman J P (2001),** Experimental Methods for Engineers, 7th Edition, McGraw-Hill, New York.

20. **Jung S, Ishida M, Yamamoto S, Ueki H and Sakaguchi D (2010),** "Enhancement of NOx-PM Trade-Off in a Diesel Engine Adopting Bio-Ethanol and EGR", International Journal of Automotive Technology, Vol. 11, pp. 611-616.

21. **Kim Y J, Kim K B and Lee K H (2011),** "Effect of a 2-Stage Injection Strategy on the Combustion and Flame Characteristics in a PCCI Engine", International Journal of Automotive Technology, Vol. 12, pp. 639-644.

22. **Kokjohn S L, Hanson R M, Splitter D A and Reitz R D (2009),** "Experiments and Modeling of Dual-Fuel HCCI and PCCI Combustion Using in-Cylinder Fuel Blending", in SAE Tech Paper, SAE (2009-01-2647).

23. **Kotani D, Yoshida K, Shoji H and Tanaka H (1998),** "Study on Combustion Characterization of Lean Mixture Ignited by Diesel Fuel Injection", JSAE Rev., Vol. 19, pp. 311-317.

24. **Kouremenous D A, Rakopoulos C D and Kotsiopoulos P (1990),** "Comparative Performance and Emission Studies of Vaporized Diesel Fuel and Gasoline as Supplement in Swirl-Chamber Diesel Engines", Energy, Vol. 15, pp. 1153-1160.

25. **Krishnan S R, Srinivasan K K and Midkiff K C (2007),** "Phenomenological Modeling of Low Temperature Advanced Low PilotIgnited Natural Gas Combustion", SAE Tech Paper, SAE (2007-01:0942).

26. **Lyn W T (1954),** "An Experimental Investigation into the Effect of Fuel Addition to Intake Air on the Performance of a Compression-Ignition Engine", Proc. lnst. Mech. Eng., Vol. 168, pp. 265-279.

27. **Odaka M, Koike N, Tsukamoto Y and Narusawa K (1992),** "Optimizing Control of NOx and Smoke Emissions from DI Engine with EGR and Methanol Fumigation", SAE Tech Paper.

28. **Osses M, Andrews G E and Greenhough J (1998),** "Diesel Fumigation Partial Premixing for Reduced Particulate Soot Fraction Emissions", SAE Tech Paper, SAE (98053).

29. **Papagiannakis R G and Hountalas D T (2004),** "Combustion and Exhaust Emission Characteristics of a Dual Fuel Compression Ignition Engine Operated with Pilotdiesel Fuel and Natural Gas", Energy Convers Manage, Vol. 45, pp. 2971-2987.

30. **Sahin Z (2009),** "Experimental and Theoretical Investigation of the Effects of Gasoline Blends on Single-Cylinder Diesel Engine Performance and Exhaust Emissions", Energy Fuels, Vol. 23, pp. 1707-1717.