



# An Experimental Investigation of Outlet Performance on CI Engine Filled with Soyabean Blended with Methanol

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**Abstract**—All over the world the use of petroleum products has increased day by day. The Vehicle population is also increasing day by day. The vehicle population has tremendously increased in the recent year with the explosion of vehicle population in the Worldwide. As the vehicle population increases the use of fossil fuels like petrol and Diesel has also increased tremendously. The present automobile industry like petrol engine, diesel engine uses the fossil fuel like petrol and diesel as fuel. The pollution caused by this fossil fuel has much more effect on environmental air pollution. All over the world many researchers are trying to reduce the emission from these engines to protect the environment from air pollution. For the above mentioned problem many researchers have develop the catalyst converter to reduce the exhaust emission like CO, HC and NOX. Generally CO, HC, NOx, SO<sub>2</sub>, particulate matters and smoke are treated as emissions from the exhaust gas of engines. Among these emissions, HC and CO are more toxic in nature which leads to air pollution. The diesel engine being predominant than petrol engine in developed countries like India, these engines are widely used in the sectors like agriculture, power and automobile. Finally we conclude that use of ethanol blended fuels resulted in reduced usage of petroleum products. Main aim of the project is to reduce emissions like HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub> from the exhaust gases of diesel engine. Vegetable oils are considered as good alternatives to diesel as their properties are close to diesel. Thus they offer the advantage of being used readily in existing diesel engines without modifications. Hence to meet these requirements humans have to look towards alternatives to the petroleum based fuels like petrol and diesel. This project tries to find an alternate to diesel fuel. Initially base line data was generated with diesel and neat Soyabean oil. Subsequently, Soyabean oil was converted into its methyl ester by transesterification to minimize the problems of volatility, viscosity and polyunsaturated characters faced while using crude oil.

**Keywords**— CO, HC, NO<sub>x</sub>, SO<sub>2</sub>, NO<sub>x</sub>, SO X .

## I. INTRODUCTION

From the 18th century started research and finding of small prime mover to run machines for the purpose of movement an duplication in the industrial one steam engine initial stage they are not satisfied filament became of efficient in less and more quantity energy density required low in fuels like coal after a time 178th century diesel engine was developed these become very important during the period during those days and they are substituted with the steam engine which become obsolete they are more popularly used for world wide for transportation used for agricultural decentralized in power sector for power generation purpose and in industrial efficiency use due to more fuel conversion efficiency, rugged less and relatively smooth operation these will leads raising a demand of petroleum products, petroleum fuels are available source of energy and hence a over reliability on these fuels will not leave for a long run some of the particulates like soot, oxides of nitrogen and carbon monoxide are very much danger to the people who leaves in the society and also the animals and all living beings where the observation of the utilization of vehicles from the year 1990 to 2020 increase in vast and at the same time polluting the environment in rapid condition due to requiring and utilization increased in fossil fuels from last 30 years.

Therefore on a nutshell it can be stated that contact regarding length period availability of stringent environmental, petroleum diesel and environmental impacts due to extensive use of diesel engines have interested to find for a renewable other diesel fuel. In context alcoholic fuels as a partial or complete substitute of diesel is an area of interest. Data's for motor used alcohols as fuel were printed in 1907 and in depth finding work was carried

Among the alcohols, lowest combustion energy present in the methanol. Any how, it also contains chemically correct air-fuel ratio or. Lowest stoichiometric the maximum power will be happen due to engine burning the methanol. A many number of experiments are conducted up on methanol as an optional fuel with the collecting information. Methanol, is the very lite of alcohol and actually first started by the irreparable damage distillation of wood. However, methanol can be

## II. CURRENT USES

In heavy duty –trucks Hundred percentage of methanol is used. Form 1965 the transit buses are furnish with CI diesel engines, M100 is the more famous fuel for Indianapolis 500 racecars that it is very safe than the gasoline fuel. complex combination of methanol with 85% and gasoline

9M85) with 15% utilized in a passanger cars and moderates trucks. current days methanol is utilized in fuel cell finding out because pure methanol can be reformed in fuel cells into hydrogen, further it is utilized to power fuel cell electric vehicles. In the West, primarily in California utilization of methanol powered in vehicles are observed more in numbers. they are also observed in others places like fleets of the federal government and the New York State Thruway Authority

## III. OBJECTIVES OF THE PROJECT

- 1) It is advised to utilize Methanol blended with Soya bean oil as a Fuel in the diesel engine (CI Engine).
- 2) HC, CO, CO<sub>2</sub>, and NO<sub>x</sub> are few emissions in the outlet gases are also advised to lower during the combustion itself.
- 3) To learn the performance evaluation of the using Methanol blended with Soya bean oil in the diesel engine to analyze the exhaust emissions.
- 4) It is suggest to utilize Methanol blended within diesel engine Soya bean oil as Fuel (CI engine).

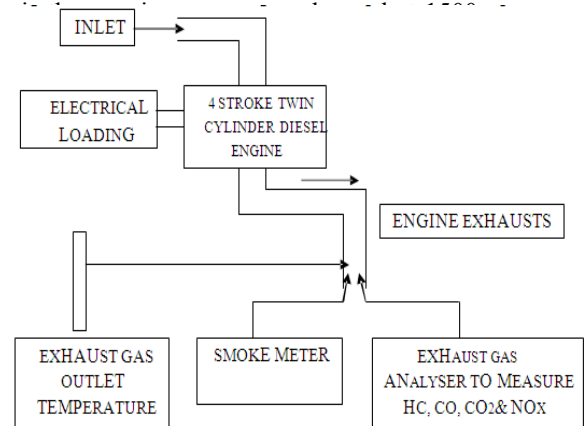
## IV. METHODOLOGY

Basically, Methanol is a minimum cetin fuel and hence it has no capability to auto ignite in a compression ignition engine. However, the new method used Methanol in a diesel engine after minor engine changes.

- Selection of Methanol blended with Soya bean oil.
- Creating an experimental setup with required instrumentation to learn or gain the knowledge of presentation, emission & combustion characteristics of the diesel engine fueled with Methanol.
- Conducting experiments with Methanol blended with Soya bean oil in the stationary engine to know the exhibits and shows, emission and combustion characteristics and compare it with diesel.

## V. EXPERIMENTAL SETUP

- A) As shown in the below fig it consist of two cylinder diesel engine, four stroke ,the cooling system is forced one and start is by crank load bank is provided for a resistance purpose. to conduct test and Stack observing kit is used for particulate matter and formaldehyde as HCHO etc through Multi gas analyzer performers and emission are going to be found. engine is cooled by by using water jacket in the engine block and cylinder is utilizing a forced feed limit 27° BTDC it was given by the manufacture which is indicates injection timing 1800



**Fig 5.1 experimental set-up**

**Fig 5.2 Test Engine**

**Table 1:**  
**Schematic arrangement of Experimental Set-up**

|                   |   |
|-------------------|---|
| Engine type       | Four stroke Twin cylinder diesel engine |
| No. of cylinders  | 02                                      |
| Stroke            | 100 mm                                  |
| Bore Diameter     | 87 mm                                   |
| Engine power      | 19 KW                                   |
| Compression ratio | 17.5:1                                  |
| RPM               | 1500                                    |
| Type of starting  | Crank starting                          |
| Load type         | Electric load bank                      |



**Fig 4.4 Gas analyzer**

**B) Fuel Supply And Measurement**

The fuel flow rate was found out on the volume basis using a burette and stopwatch.



**Fig 4.3 Fuel supply**

**C) Measurement Of CO, HC Emissions**

Utilization of Gas Analyzer is to measure the outlet emissions of UBHC and CO emissions. a exhaust sample before being sent to the analyzer is made to flow through a cold trap and a filter element to stop water vapor and particulates from flow through the analyzer. While HC emissions are measured in ppm hexane equivalent, CO is measured in terms of percentage volume.

**D) Engine Loading**

Electric loading (water loading) was used to load the generator connected to the engine. Once the engine is started, it can be loaded in steps of 0.5 KW using the water loading. Voltmeter and ammeter is connected to the generator to measure the voltage current and in turn power in watts.



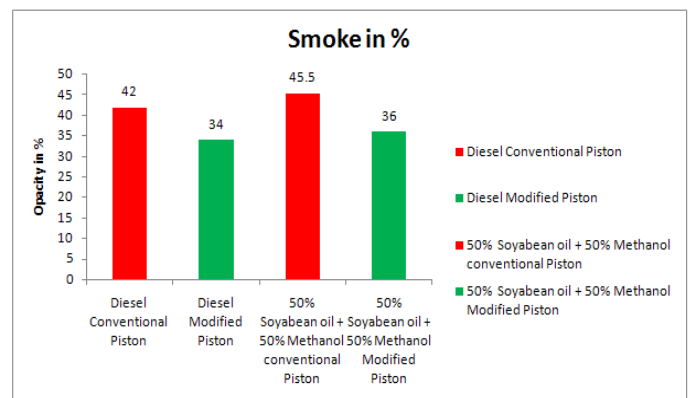
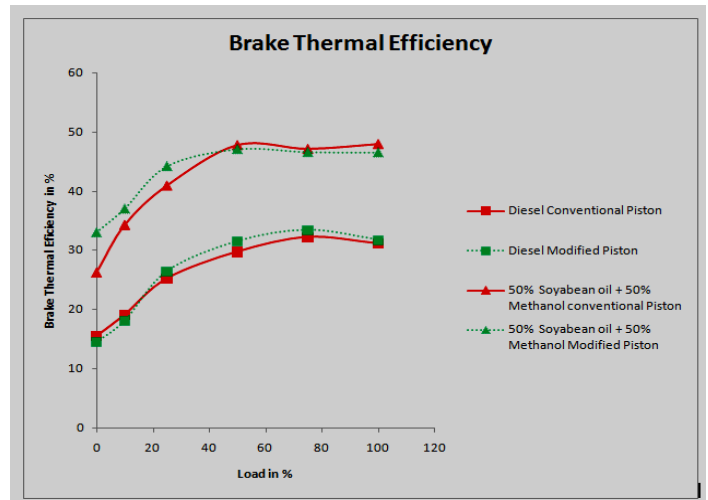
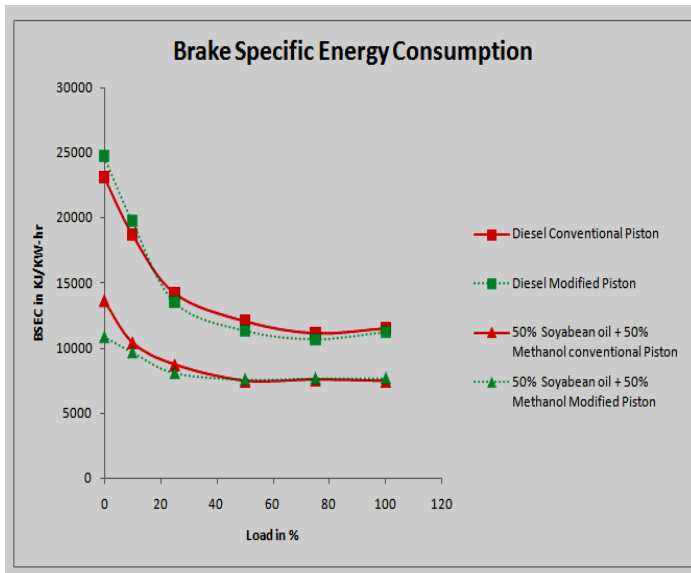
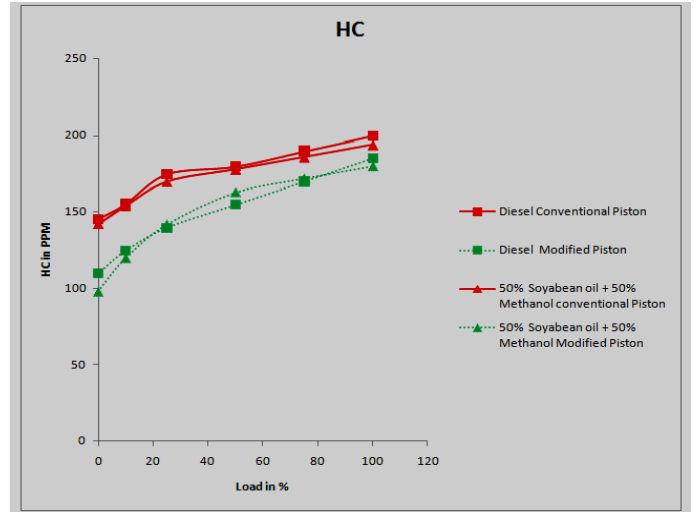
**Fig 4.5 Electric loading**

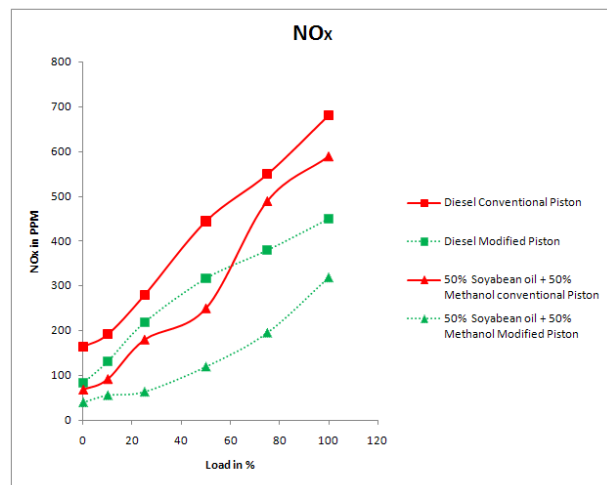
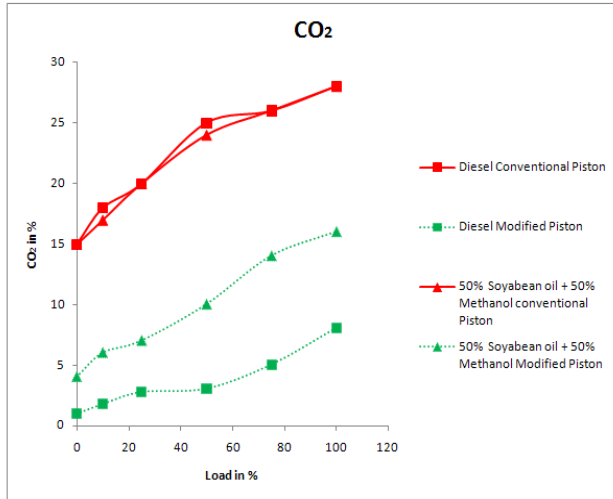
**E) Other Measurements**

The exhaust gas temperature is measured using a thermocouple placed at the exhaust manifold. The output of the thermocouple is connected to a thermometer. The exhaust gas CO and HC are measured by using gas chromatography.

VI. RESULT AND DISCUSSION

| BSEC |                            |                        |  |  |
|------|----------------------------|------------------------|--|--|
| %    | Diesel Conventional Piston | Diesel Modified Piston | 50% Soyabean oil +50% Methanol conventional Piston | 50% Soyabean oil +50% Methanol Modified Piston |
| 0    | 23214.5                    | 24762.23               | 13693.07   | 10871.04                                       |
| 10   | 18779.1                    | 19822.43               | 10471.49   | 9698.68  |
| 25   | 14243.4                    | 13587.15               | 8770.73  | 8126.74  |
| 50   | 12082.4                    | 11406.47               | 7512.95  | 7631.56  |
| 75   | 11157                      | 10758.58               | 7614.94  | 7710.79  |
| 100  | 11548.2                    | 11315.11               | 7484.8   | 7721.23  |





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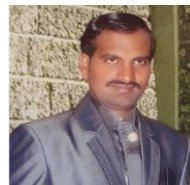
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