Approach Towards Altering Fossil Fuels by Bio Fuels with Design Change Idea in injector nozzle for C.I. Engine

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ABSTRACT

This research work depends on enhancing the execution of the diesel engine when they utilized bio diesel oil as an optional fuel without real alteration of engine design. It is also required to grow non edible feed stocks in the waste or marginal land of Gujarat. Work goal is to recognize best suitable Bio-Diesel mix by keeping numerous parameters on it. Bio-Diesel mixes will be given credit score and afterward tentatively finish up for best execution in single cylinder C.I. engine. It was clear by concentrating on numerous exploration research paper that as blending increase, the performance of engine decreases because of viscosity and density of bio diesel oil which is higher than diesel fuel. Higher blending which is not properly atomization of fuel so it is affecting the performance. Engine performance is mostly dependent on fuel atomization and complete burn of fuel mixture. Henceforth, it would be innovative to concentrate on diverse fuel infusion parameters like compression ratio, injection pressure, spray cone angle, nozzle geometry, spray tip penetration, injection timing, temperature, and droplet size which can enhance the execution of the engine as bio diesel oil fuel. There are two essential targets of this exploration, first is to choose proper Bio-Diesel mixes among numerous non eatable oil seeds. At that point, trial examination with different injection pressure and vary number of nozzle holes enhancing the execution of engine and decrease lethal emissions to minimize environmental change impact.
Keywords: Bio fuels, Bio Diesel, C.I. Engine, Injector Nozzle, Bio diesel blends

I. INTRODUCTION

These fossil fills are non-renewable and because of proceed with use, they will drain later on and there will be vitality emergency on the planet. Numerous specialists trust that by the year 2070, the world will be depleted of fossil powers. The utilization of fossil fills likewise contaminates the earth and causes ecological issues like a dangerous atmospheric deviation, green-house impact, air-contamination and so forth.

In addition, critical fossil energizes like oil and gas are amass in a percentage of the nations, coming about the remaining nations such as India need to totally relies on upon such nations which are delivering oil and gas. The value structure of these items is likewise chosen by political mathematical statements other than regular exchange laws. The import of oil and gas costs significant remote trade which likewise influences the nation economy.

In country like India, the consumption of petroleum products and natural gas increases year by year. As a result, the import bill also increases. This adversely affects the economy of country.

TABLE 1

INDIA CRUDE OIL CONSUMPTION AND IMPORTS

Item	2008-09	2009-10	2010-11
Consumption	160.77	192.77	206.15

Imports			
(a) Quantity **(Mn. Tonne)**	132.78	159.26	163.59
(b) Value **(Rs. Billion)**	3481.49	3753.78	4559.09

Source: Public Sector Undertakings/Ministry of Finance/Petroleum Planning &Analysis Cell

Renewable Energy Sources

There are various types of renewable energy sources such as solar, wind, hydropower, ocean thermal energy, geothermal energy, wave energy, biomass and bio energy etc. It is very necessary to develop the sources of renewable energy and increase its utilization to reduce dependency on fossil fuels and environmental pollution. These renewable energy sources will be very important in the future when fossil fuels are depleted.

1. Bio-mass and bio-energy
2. Bio-diesel

Biodiesel alludes to any diesel fuel substitute that got from renewable biomass. All the more particularly, biodiesel is characterized as oxygenated, without sulfur, biodegradable, non-harmful and eco-accommodating option diesel oil. Synthetically, it can be characterized as a fuel made out of mono-alkyl esters of long chain unsaturated fats got from renewable sources, for example, vegetable oil, creature fat and utilized cooking oil and so forth. As an option fuel, biodiesel can give power like ordinary diesel fuel and along these lines might be utilized as a part of diesel motors.

Biodiesel fuels are fatty acid methyl esters which has drawn attention as a renewable, bio degradable and nontoxic fuel. Biodiesel may be produced from various sources such as vegetable oil both edible oils (soybean, cottonseed, palm, peanut, rapeseed, canola, sunflower etc.) and non-edible oils (Jatropha, Karanj, Jojoba, Mahua, Neem etc.), waste cooking oil, animal fat, municipal waste etc.

However, production of Bio-diesel from edible oil crops is not desirable. Recently, there are many concerns regarding the use of food crops as feedstock for fuel production. Using crops for energy and food compete with each other in many ways (agricultural land, skilled labor, water, fertilizers etc.). Moreover, the high price of biodiesel derived from food grade vegetable oils makes it difficult to compete economically with the fossil-based diesel. A less expensive, non-food grade vegetable oil is a potential feedstock for biodiesel production (Titipong, 2011) [1].

The species which are grown in Gujarat can be found out by studying the Biological diversity of Gujarat [2]. With the help of this study, total 28 species are found to grow in Gujarat majorly named as Yellow oleander, Desert date, Bastard myrobalan, Ratanjyot, Putranjiva, Neem, Drumstick tree, Karanj, Bael tree, Soapnut , Kusum, Mahua, Tumba, Jojoba, Castor, Kapok, Taramira, Tobacco, Milk bush

Bio-diesel can be used either directly in to the CI engine or it can be blended with petro diesel in different proportions. B100 is 100% biodiesel. It is a very clean burning non-toxic fuel. From B100 one can make the grades that are commonly used. B20 is 20 % biodiesel and 80 % petrol diesel fuel. The B20 blend is the desired blend in use with current technology and regulations. Biodiesel of 20 % blend or below will work with any diesel engine without any modifications. B20 also provides similar horse power, torque and mileage as diesel. This is the most commonly used blend and is covered by vehicle manufacturers.

II. METHOLOGY

The procedure followed during the finding of best suitable bio diesel blends as under:

(1) To identify Oil yield of the feed stocks available for bio-diesel production in Gujarat.
(2) To select the best five feed stocks having highest yield to fulfil the requirement of economical production of bio-diesel.
(3) To measure various fuel properties of the selected five bio-diesels.
(4) To measure various engine performance parameters for B20 blends of the selected five bio-diesels.
(5) To measure pollution and exhaust emissions parameters.
(6) To analyse the selected feed stocks based on the economy, fuel properties, engine performance and exhaust emissions aspects and identify the best feed stock.
(7) After finding of best feed stocks from above procedure, check for the performance of engine to

reduce emissions with minimum design change in C.I. Engine.

Factors affecting the performance of Diesel engine when using bio-diesel blend as fuel

1. Properties of fuel
2. Nozzle size and hole number
3. Injection pressure, compression ratio and injection timing
4. Droplet size, spray cone angle and spray tip penetration (spray characteristics)
5. Temperature

From all the above parameters Nozzle size and Number of holes plays a dominant role for enhancing performance of diesel engine and slightly affects to emission control too. The engine performance, power output, economy etc is greatly dependent on the effectiveness of the fuel injection system. The fuel injection system is the most vital component in the working of CI engine. The injection system has to perform the important duty of initiating and controlling the combustion process. When the fuel is injected in to the combustion chamber towards the end of compression stroke, it is atomized into very fine droplets by injector nozzle which is given below.

For biodiesel fuel the nozzle hole number is increase and decrease size of holes which combination is properly atomized the fuel for strongly effect combustion and emission, high percentage of biodiesel blend with diesel give good performance, decrease brake specific fuel consumption of the engine and good spray characteristics of the fuel but for diesel fuel is increase specific fuel consumption and also effect the thermal efficiency of the diesel engine.

Experiment examination will be done to check the practicality of suitable mix such as different injection pressure and number of injector nozzle holes for enhancing the execution of engine.

Compare the consequences of brake power, brake thermal efficiency and brake specific fuel consumption, indicated thermal efficiency, mechanical efficiency and emission with ordinary Diesel fuel.

III. OUTCOMES

(1) Concludes most encouraging feed stock from all the aspects and two most promising feed stock for biodiesel production in Gujarat.

(2) Best suitable and promising feed stock will be undergoes by testing on Single Cylinder C.I. Engine which provides data in terms of Break Specific Fuel Consumption, Break Specific Energy Consumption, Break Thermal Efficiency, Indicated Thermal Efficiency, Mechanical Efficiency.

(3) Comparative studies with different nozzle size, number of holes and injection pressure with ordinary diesel fuel and bio fuels.

(4) Concludes optimum injection pressure and number of nozzle holes for better power and lesser exhaust emission

(5) Observation and findings of all above mechanical consequences and comparative data.

IV. CONCLUSION

(1) This study aims to replace conventional fossil fuels to non-polluting bio fuels that can be grown on the waste or marginal land in Gujarat state.

(2) Alternation of fuel in C.I. Engine with nominal change in design for better power output and to reduce marginal exhaust emission

(3) Moreover, study will be concentrated towards feed stocks which are non-edible and hence, production of bio-diesel from these feed stocks will not affect the supply chain of edible oil.

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