Experimental Studies on Emission Characteristics of Honge, Simarouba(Bio- Diesel) Fuelled C.I.Engine

Viswas D[1], Pradeep Kumar B.C[2]
[1, 2]Dept of Mechanical Engineering
[2]Assistant professor, Dept of Mechanical Engineering
[1, 2] HMS Institute of Technology, Tumakuru, karnataka

Abstract- *Energy conservation is important for most of the developing countries. The rapid depletion in world petroleum reserves and uncertainty in petroleum supply, as well as the sharp escalations in the petroleum prices have stimulated the search for alternatives to petroleum fuels. This project aims at finding an alternative for diesel and reducing the pressure on its existing demand. In our project we have tried Honge oil and Simarouba oil with diesel as the alternate fuel.*

The present work relates to the modification to the C.I engine design for inducing turbulence by providing additional squish locations to improve proper mixing of air fuel mixture to improve the combustibility of the combustible mixture. This modification includes the formation of diamond shaped grooves of 1mm depth on the land of piston. This arrangement induces the turbulence due to squish motion of combustible mixture during combustion, through which better combustion can be achieved. The effect of squish, injection pressure, compression ratio and bio-diesel mixture proportion on emission characteristics of bio-diesel fuelled diesel engine are studied and compared with the base engine.

Keywords- Bio fuel, Diesel engine, Honge, Simarouba

I. INTRODUCTION

Diesel engine is a well known prime mover for transportation, horticultural apparatus and ventures. Diesel fuel is to a great extent devoured by the transportation and horticultural segments. Diesel and petroleum motors are the principle wellsprings of carbon dioxide, carbon monoxide and un-consumed hydrocarbon emanations and increment in carbon dioxide, carbon monoxide levels in the climate prompts a worldwide temperature alteration and green house impact. Effective utilization of characteristic assets is one of the key necessities for any nation to wind up self practical with the non-renewable energy source draining quick, scientists have focused on growing reasonable answer for the vitality emergencies.

There are in excess of 300 unique types of trees in India, which produces oil. bio diesel can be reaped and sourced from non palatable oils like Curcus, Honge, Neem, Mahua, linseed, Simarouba and so on. Out of these plants, we are concentrating on Honge oil and Simarouba oil which can develop in bone-dry and badlands. Usage of bio-diesel in India will prompt numerous focal points like green cover to no man's land, and diminishment in reliance on imported unrefined petroleum and lessening in air contamination.

The present investigation manages the impact of cylinder geometry and infusion Weight on outflow qualities of Honge and Simarouba bio-diesel fuelled C.I.Engine. The piston surface has been altered by giving jewel formed notches Three notches are made to a point of 120degree in the piston toward the finish of pressure stroke to initiate better air fuel blending and to enhance the instability of ignitable blend.

II. LITERATURE REVIEW

In this section examines are completed on outflow attributes for the adjusted motor by the before specialists with respect to the utilization of diesel and biodiesel as fuel in diesel motors are displayed.

G. Nagarajan, and B. Nagalingam [1] The principle issues with the utilization of slick vegetable oils in diesel motors are higher smoke levels and lower warm proficiency when contrasted with diesel. The issue can be handled by drafting a vaporous fuel in the admission complex alongside air. In this examination, hydrogen was utilized as the drafted fuel and elastic seed oil (RSO), elastic seed oil methyl ester (RSOME) and diesel was utilized as principle powers in a double fuel motor. Double fuel activity of shifting hydrogen amount with RSO and RSOME brings about higher brake warm productivity and huge diminishment in smoke levels at high yields.

Prof .V.Pandurangadu, V.V.Pratibha Bharathi &V.V.Naga [2] to accomplish the diverse twirl powers in the chamber, three outline parameters have been changed: the barrel head, cylinder crown, and bay channel. Along these lines, the cylinder crown is adjusted i.e. change of burning chamber to improve the turbulence in the barrel. This

strengthening of the whirl is finished by cutting notches on the crown of the cylinder. In this work three distinct arrangements of cylinder i.e. in the request of number of scores 3, 6, 9 were utilized to heighten the whirl for better blending of fuel and air and their impacts on the execution and outflow are recorded.
Yang C [3] the high squish ignition chamber could diminish NOx and particulate at the same time in an immediate infusion diesel motor. This examination researches the impact of high squish ignition chamber geometry on burning and discharge qualities and breaks down motor information utilizing endoscopic fast photography and CFD reenactment. The outcomes demonstrate that the high squish ignition chamber with focal pip is successful to diminish both NOx and particulate. Ignition chiefly proceeds under the squish lip until the finish of burning. The burning district shapes rich and high turbulence air, which diminish NOx and keep unburned gas from streaming unconscious freedom volume.

John B. Heywood [4] His encouraging and intrigue lay in the territories of thermodynamics, ignition, vitality, power and impetus. Amid recent decades, his exploration exercises have fixated on the working qualities and fills necessities of car and air ship motors. A noteworthy accentuation has been on PC models which foresee the execution, productivity and discharges of start, diesel and gas turbine motors, and in completing examinations to create and approve these models. He is an individual from publication sheets of diaries advance in Vitality and burning science and the Global diary of vehicle outline

III. EXPERIMENTATION

To start with, standard piston (without alteration) was tried. The tests were performed at various burdens and for diesel and with Honge bio-diesel, Simarouba bio-diesel (H20, S20) at a pressure proportion of 17.5 for various infusion weights. The tests were performed at various burdens and for diesel and diverse proportionality of diesel with Honge, Simarouba bio-diesel and the outcomes were contrasted and the base motor.

3.1 MODIFIED PISTON

The surfaces over the piston were done to close resistances on an etching machine. The multi scored piston comprises of three little holes called squish chambers 120deg separated on the piston arrive.

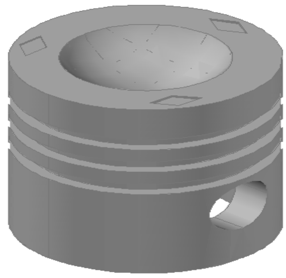

Fig 3.1 modified piston

IV. RESULTS

4.1 Brake Thermal Efficiency:

At CR=17.5, Standard Injection Timing (21^0) using DIESEL: Injection Pressure 200 bar

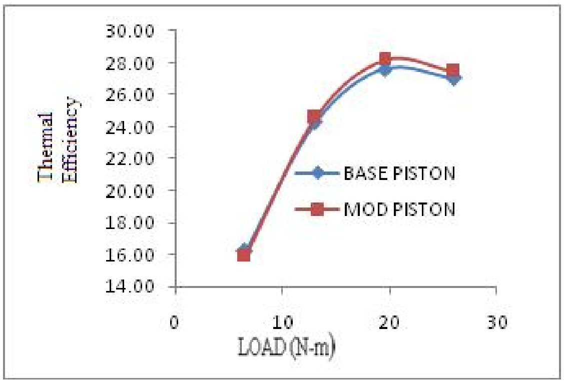

Fig 4.1

Fig 4.1 demonstrates that the thermal efficiency of the altered piston engine is marginally higher than that standard piston engine. For Diesel fuel with CR 17.5 and standard infusion timing, effectiveness is expanded by 2.12% at 200bar. At similar conditions results were seen as 2.22% at 250bar and 1.76% at 300bar.

On using HONGE bio diesel,it was seen that the thermal efficiency of the changed piston motor is somewhat higher than that standard piston motor. For Honge fuel CR 17.5 and standard infusion timing, effectiveness is expanded by 3.52% at 200bar, 2.91% at 250bar and 2.62% at 300bar.

On using SIMAROUBA bio diesel,it was seen that the thermal efficiency of the modified piston motor is marginally higher than that standard piston motor. For Simarouba fuel CR 17.5 and standard infusion timing, effectiveness is expanded by 3.25% at 200bar, 3.40% at 250bar and 3.05% at 300bar.

4.2 Emission Characteristics

4.2.1 Carbon monoxide:

CR=17.5, Standard Injection Timing (21^0) using DIESEL

Injection Pressure 200 bar

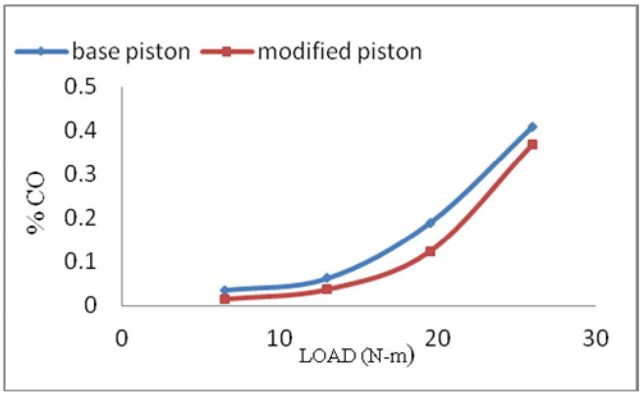

Fig 4.2.1

Fig 4.2.1 shows that the CO emanations for CR 17.5 and standard infusion timing ,CO discharges are lower than that standard piston motor. This is because of better ignition in a modified piston motor because of better air fuel blending. CO discharges are lessened by 35% at 200bar. Similarly at same conditions it was seen that emissions were reduced by 40% at 250bar and 32% at 300bar.

On using HONGE bio diesel, CO discharges are decreased by 27% at 200bar, 25% at 250bar and 18% at 300bar.

On using SIMAROUBA bio diesel, CO emanations are decreased by 35% at 200bar, 32% at 250bar and 42% at 300bar.

4.2.2 Hydro-Carbons:

CR=17.5, Standard Injection Timing (21^0) using DIESEL: Injection Pressure 200 bar

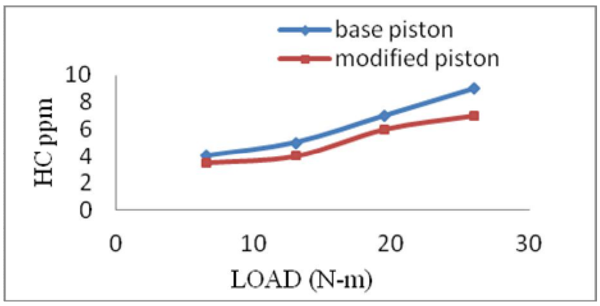

Fig 4.2.2

Fig 4.2.2 demonstrates that the HC discharges of diesel for altered piston motor are lower than that standard piston motor. This is because of better burning in adjusted piston motor because of better air fuel blending. HC emanations are diminished by 20% at 200bar. Under same conditions HC emissions were reduced by 18% at 250bar and 17% at 300bar.

On using HONGE bio diesel, HC emissions are reduced by 20% at 200bar, 22% at 250bar and 15% at 300bar respectively.

On using SIMAROUBA bio diesel, HC emissions are reduced by 25% at 200bar, 23% at 250bar and at 300bar respectively.

4.2.3 Oxides of Nitrogen:

CR=17.5, Standard Injection Timing (21^0) using DIESEL: Injection Pressure 200 bar

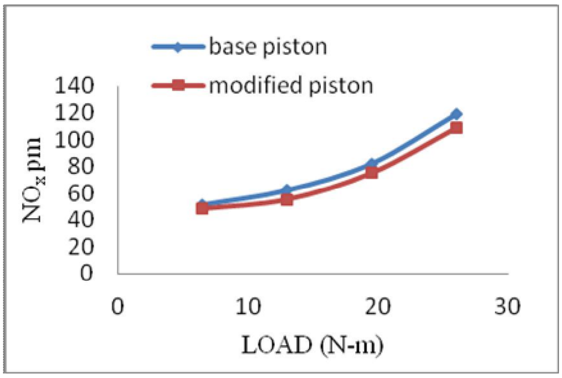

Fig 4.2.3

Fig.4.2.3 shows that the NOx emissions of diesel for modified piston engine are lower than that standard piston engine. This is due to increased heat transfer due to the additional squish formation by diamond shaped grooves which controls the rise in cylinder temperature. NOx emissions are reduced by 8.5% at 200bar. It was seen that NOx emissions were reduced by 8.7% at 250bar and 5.9% at 300bar. At low loads cylinder peak pressure decreases and results in lower peak temperatures. Hence the NOx concentration is reduced.

On using HONGE BIO DIESEL, NOx emissions are reduced by 8.3% at 200bar, 7% at 250bar and 8% at 300bar.

On using SIMAROUBA bio diesel, NOx emissions are reduced by 7% at 200bar, 7.9% at 250bar and 7% at 300bar.

V. CONCLUSION

1. Instability of burning blend has been enhanced because of better blending of fuel with air contrasted with standard piston.
2. Because of better ignition with modified piston the thermal efficiency was increased by 2.03% with standard diesel fuel, 3.02% with Honge Biodiesel (H20) and 3.23% with Simarouba Biodiesel (S20) .
3. Better blending and ignition with modified piston lessened the outflow of CO. it is watched that emanation of CO is lessened by 35% with standard diesel fuel, 23% with Honge Biodiesel (H20) and 36% with Simarouba Biodiesel (S20).
4. It is likewise watched that Un-Burnt Hydro-Carbons (UBHC) discharges for modified piston motor at all infusion weights are not as much as standard piston. UBHC emanation is decreased by 18% with standard diesel fuel, 19% with Honge Biodiesel (H20) and 22% with Simarouba Biodiesel (S20) is seen with modified piston.
5. NOx outflows for modified piston motor at all infusion weights for both diesel and biodiesel (H20, S20) are low when contrasted with standard piston motor because of better ignition. NOx emanation is diminished by 7.7% with standard diesel fuel, 7.77% with Honge Biodiesel (H20) and 7.3% with Simarouba Biodiesel (S20) is seen with modified piston.

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