ABSTRACT

The increase in demand and rapidly depleting of fossil fuels causes the whole world to fight with acute shortage of energy sources. More usage of diesel fuel not only in agriculture sector but also in transport sector due to enormous increase of vehicle population and increase of pollution levels with fossil fuels, it is necessary to find an alternative resource of fuel like Biodiesel, which is produced from natural and renewable sources such as vegetable oils.

The greater advantage of Biodiesel is it can be used in any diesel engine with little (or) no modifications. The drawbacks associated with the biodiesel are low volatility and high viscosity leading to sticking of oil on the wall of the combustion chamber causing poor combustion. This disadvantage can be rectified to greater extent, by blending biodiesel in the diesel. The biodiesel blends can be used as a fuel for diesel engine.

Due to the lower temperatures and pressures within the combustion chamber of traditional diesel engines, the burning of the biodiesel won't be complete. The drop in the thermal potency is found as a result of low heat value and high viscosity of biodiesel. If the heat losses of the engine are controlled with the thermal insulation, the heat in the combustion chamber can be increased. The increase in heat of combustion chamber helps to burn biodiesels completely and the thermal potency of the engine can be increased.
In the present work “PERFORMANCE EVALUATION OF A FOUR STROKE DIESEL ENGINE +BY USING VARIOUS BIODIESEL BLENDS WITH AN AIR GAP AND INSULATED PISTON INSERTS” experimental investigations were carried out on a four stroke diesel engine with 5 totally different Biodiesel (i.e. Jatropha, Karanja, Mahua, Cotton seed and Neem biodiesels) blended with diesel separately to evaluate its performance.

With the various modes of transfer of heat from the combustion chamber, most of the heat transfer happens through the piston. In the present work in order to cut back the heat losses through the piston an air gap is developed between the piston crown and piston skirt and experiments were conducted by varying this air gap from 1 mm to 2.5 mm. This air gap reduces the heat losses from the piston crown to the piston skirt. This will increase the heat within the chamber and heats the incoming fresh charge, hence the combustion and thermal efficiency of the engine is improved.

Although the air gap insulated piston configuration offers improved performance, a lot of warmth is lost to the exhaust gases. If these losses be controlled, the thermal potency of the engine can be increased. Hence in order to achieve this in the present work experiments were conducted on insulated engine, which is developed by employing piston crown which is created with totally different thermal conductivity phenomenon metals i.e. Copper, Cast iron and Brass. The performance and emission characteristics of the engine are studied to find best piston crown.
Among all the biodiesels tested the cotton seed biodiesel is found to be the best and cotton seed biodiesel blend B20 is optimum blend. From various air gaps tested in this experimental work it’s found that 2mm air gap within the piston shown best performance. The brass piston crown is showing better performance than the other piston crowns.