International Journal of Automobile Engineering
Research and Development (IJAuERD)
ISSN(P): 2277-4785; ISSN(E): 2278-9413
Vol. 6, Issue 1, Feb 2016, 1-14

Original Article

IMPACT OF INJECTION TIMING AND INJECTION PRESSURE ON PERFORMANCE PARAMETERS AND COMBUSTION CHARACTERISTICS OF HIGH GRADE SEMI ADIABATIC DIESEL ENGINE WITH COTTON SEED BIODIESEL

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ABSTRACT

The biodiesel available from vegetable oil feedstock is an important substitutes for diesel fuel, due to comparable properties with diesel fuel. It is easily available and renewable in nature. However, drawbacks associated with biodiesel of moderate viscosity and low volatility call for semi adiabatic diesel engine. The objective of semi adiabatic diesel engine is to minimize heat loss to the coolant, by providing thermal resistance to the heat flow to the coolant. In this work cottonseed biodiesel was used as sole fuel in conventional diesel engine and LHR direct injection (DI) diesel engine. It consisted of an air gap insulated piston, an air gap insulated liner and ceramic coated cylinder head with different operating conditions of cotton seed biodiesel with varied injection timing and injector opening pressure. Combustion characteristics were determined at full load operation with special pressure-crank angle software package. Performance parameters of brake thermal efficiency, brake specific energy consumption, exhaust gas temperature, coolant load and volumetric efficiency were determined. At full load operation of the engine. Combustion characteristics of peak pressure, maximum rate of pressure rise and time of occurrence of peak pressure were evaluated at full load operation of both versions of the engine. LHR engine with biodiesel increased peak brake thermal efficiency by 3% at manufacturer's recommended injection timing and 10% at optimum injection timing in comparison with conventional engine with biodiesel operation at recommended injection timing and optimum injection timing. Semi adiabatic engine fuelled with biodiesel showed improved performance and combustion characteristics at 27^{o} bTDC and at optimum injection timing over CE.

KEYWORDS: Vegetable Oil, Biodiesel, LHR Combustion Chamber, Fuel performance,Combustion Characteristics

Received: Jan 30, 2016**; Accepted:** Feb 06, 2016**; Published:** Feb 13, 2016**; Paper Id.:** IJAuERDFEB20161