

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

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ABSTRACT

Biodiesel obtained from feed stocks of vegetable oils are important substitutes of diesel fuel, as they are renewable and biodegradable. However, with moderate viscosity and low volatility of biodiesel cause combustion problems in CI engines, call for hot combustion chamber engines, which provide hot environment for burning moderate viscous biodiesel fuels. With cotton seed biodiesel investigations were carried out to evaluate the performance of low heat rejection combustion chamber. It consisted of an air gap insulated piston with superni (an alloy of nickel) crown, an air gap insulated liner with superni insert and ceramic coated cylinder head with cotton seed biodiesel with varied injection timing. 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. 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 by means of Piezo electric transducer, TDC encoder and special pressure-crank angle software package. The optimum injection timing for conventional engine (CE) and LHR combustion chamber were 31° bTDC and 28° bTDC (before top dead centre) respectively with biodiesel. Comparative studies were made at manufacturer's recommended injection timing (27° bTDC) and optimum injection timing with biodiesel operation for CE and engine with LHR combustion chamber. Engine with LHR combustion chamber with biodiesel showed improved performance and combustion characteristics at 27° bTDC and at optimum injection timing over CE.

KEYWORDS: Vegetable Oil, Biodiesel, Conventional Engine, LHR Combustion Chamber, Fuel Performance, Combustion characteristics, Injection Timing

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