

PERFORMANCE AND COMBUSTION CHARACTERISTICS OF A LOW HEAT REJECTION DIESEL ENGINE WITH CARBURETED ETHANOL AND JATROPHA OIL

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ABSTRACT

Investigations are carried out to evaluate the performance of a low heat rejection (LHR) diesel engine consisting of air gap insulated piston with 3-mm air gap, with superni (an alloy of nickel) crown and air gap insulated liner with superni insert with normal temperature condition of jatropha oil and carbureted ethanol with varied injection timing and injection pressure. Performance parameters are determined at various magnitudes of brake mean effective pressure. Pollution levels of smoke and oxides of nitrogen (NO_x) are recorded at the peak load operation of the engine. Combustion characteristics of the engine are measured with TDC (top dead centre) encoder, pressure transducer, console and special pressure-crank angle software package. Conventional engine (CE) and LHR engine showed improved performance at recommended injection timing of 27°bTDC and recommend injection pressure of 190 bar, when compared with CE with pure diesel operation. Peak brake thermal efficiency increased by 20%, smoke levels decreased by 45% and NO_x levels decreased by 40% with LHR engine at its optimum injection timing with maximum induction of ethanol when compared with pure diesel operation on CE at manufacturer's recommended injection timing of 27°bTDC (before top dead centre).

KEYWORDS: Crude Jatropha Oil, Ethanol, LHR Engine, Performance, Pollution Levels, Combustion Characteristics