

PERFORMANCE EVALUATION OF A LOW HEAT REJECTION CI ENGINE USING VEGETABLE OILS

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Abstract

Rapid depletion of conventional energy sources along with increasing demand for energy is a matter of serious concern. The fact that petroleum based fuels will neither be available in sufficient quantities nor at reasonable price in future has revived interest in exploring alternate fuels for diesel engines. Only non-edible vegetable oils can be seriously considered as fuels for engines as the edible oils are in great demand and are far too expensive as fuels. Gum formation, filter clogging, carbon deposits at the nozzle tips, higher exhaust emissions due to high exhaust temperatures are some of the problems associated with these oils. Using of vegetable oils in low heat rejection engines is the only solution to overcome problems of these oils. The high in cylinder temperature of these engines reduces the ignition delay and aids combustion. The use of vegetable oils in the LHR engine reduces HC, CO and smoke emissions. It is planned to carry out suitable modification on the existing engine by insulating piston, cylinder liner, and cylinder head with an intention to improve the performance of the engine and to reduce emissions. Initially modifications are carried out by employing PSZ coated cylinder head and liner on the engine. Then different levels of insulation are applied by changing different pistons. The LHR engine configuration which gave the best performance is used for the subsequent investigations. Varieties of locally available vegetable oils are tried with a view to identify the best one in terms of efficiency and emissions. Volumetric efficiency drop due to high temperature environment is the main problem associated with LHR engines. Hence, experiments are conducted with supercharging to compensate the volumetric efficiency drop. Break thermal efficiency of thumba fueled supercharged LHR engine is found to be higher than the base engine run by the same fuel by 7 percent.

Keywords: Low heat rejection engine, vegetable oils, alternate fuels, performance.