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Research Article

Study on Effect of Heating Inlet Air Temperature on Emissions and Performance of Diesel Engine

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ABSTRACT

Experiments were conducted with a TD212 four cylinder, air cooled, direct injection diesel engine operated over a range of inlet air temperatures. Air flow rate decreased and fuel flow rate increased with an increase in inlet air temperature, which reduced the air-fuel ratio of the engine. Engine efficiency decreased and exhausts gas temperature increased with an increase in inlet air temperature. Injector needle lift data also confirmed that the fuel consumption increased with an increase in inlet air temperature. Results also showed that the brake specific HC and CO emissions increased with an increase in inlet air temperature. Average in-cylinder temperature increased with an increase in inlet air temperature, which might be a reason for higher NOx emissions. It also decreased the NOx emissions by 25.55% at the normal state of intake air temperature. The experiments have done in constant speed 2100 rpm and variable torque. We get lower fuel consumption by 15% and increasing in air fuel equivalence ratio by 30% as compared with the normal state.

Keywords: Diesel, Combustion, Emissions.

INTRODUCTION

Diesel engines used as prime movers are exposed to the varying climatic temperature conditions that prevail in different parts of the world, and must therefore be able to operate under all ambient conditions from winter to summer and from arctic to tropical areas [8]. As the temperature variations on the surface of the earth are rather limited, the diesel engine will not normally be exposed to really extreme temperatures. However, the changes that do occur in the ambient conditions will, among other things, cause a change in the specific fuel oil consumption, the exhaust gas amount and the exhaust gas temperature of the diesel engine. These changes are already described in our Project and will therefore be discussed in this paper [6].

Also the scavenge air, compression and maximum firing pressures of the diesel engine will change with climatic changes and, at very low ambient air temperatures, unrestricted engine operation requires adjustments of individual engine parameters [2].

This paper describes our recommendations of load-up procedures on engine start up, the supply of ventilation air to the engine room and engine operation under normal, high and extremely low intake temperature conditions.

Experimental Work:

Four cases were taken in this study with constant speed 2100 (rpm) and variable Torque (2,4,6,8 and 10) Nm and variable intake air temperature (normal, 20°C, 30°C and 40°C) and make comparison with the normal state and study how to choose the perfect state.