Effect of Insulation on the Performance of Diesel Engine

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ABSTRACT

The key objective of this paper is to improve engine thermal efficiency by reducing the cylinder heat transfer. Almost one third of the heat produced in the cylinder during the process of combustion goes as waste by transferring it to the coolant. If the amount of heat transferred to the coolant was reduced by a considerable amount, the heat would be used to perform the useful work, thus increasing the efficiency of the engine. In our work a thin layer of coating was given to the piston, cylinder head, and liner. A series of numerical investigations were conducted in uncoated cylinder, insulating top surface of the piston alone, insulating cylinder head and liner and finally by insulating all the three and data were collected at different crank position.

The piston and cylinder assembly were modeled with standard dimensions of a diesel engine using Pro/E software and imported to ANSYS to perform heat transfer analysis. Three types of insulating materials were used for coating and analysis was done at different crank positions. The heat transfer for all the before said coatings stages were quantitatively studied and the stage were there is minimum heat transfer takes place was taken as the optimum result. The results prove that the heat transfer from the engine may be reduced to a considerable amount after coating thereby the thermal efficiency of a diesel engine would be increased.

KEY WORDS: Insulation, Crank Position, Heat transfer, Thermal Efficiency.