

NUMERICAL ANALYSIS ON PISTON WITH DIFFERENT THERMAL BARRIER COATING

Abstract:

The piston is responsible for transmitting gas pressure exerted by combustion gases into reciprocating motion and is responsible for kinetic energy. During this process, the piston crown is continuously subjected to various thermal and structural shocks in the power stroke such as gas pressure load, side thrust, and connecting rod load, inertia load. This will result in piston seizing by overheating, and cracks on top land ultimately affecting engine efficiency. To reduce heat absorption and increase insulating property Thermal barrier coating is applied on top land. The modeling of the piston is made on Solid Works. In this project, the Analysis is performed on a piston made of aluminum alloy with and without thermal barrier coating materials (Magnesium zirconate, Lanthanum doped zirconate, Ytria stabilized zirconia). Structural analysis, Steady-state thermal analysis is carried out on the piston in ANSYS and aim to study its behavior by comparing it with the conventional piston.

Keywords: Thermal Barrier Coating, Structural Analysis, Steady State Thermal Analysis.