



Effect of change in piston made of different materials on applying thermal and static loading conditions

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Abstract

As Automotive industry is showing its interest in improving its technology day by day. Keeping this scenario in mind a comparative study is performed on the piston using four different materials so as to find the results of performance of piston after changing its material. For this static structural and thermal analysis is performed on a automotive piston using two different materials i.e. Cast iron, Al –alloy, graphite, structural steel. graphite which is very light in weight as compared to other metals is chosen as the material for the piston as it is well known that it act as a self-lubricating material and can give better results when implemented with different components of engine. After this Static Structural and Thermal analysis is performed on both the pistons by using ANSYS 14.5 Software. The effect of new material on the Static and thermal behaviour of piston as compared to Cast iron and Al-alloy piston is observed.

ISSN : 2278-6848



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Research Publication and Seminar

The main objective of this study is to check the variations in stresses and thermal behaviour when replacing the piston material with of graphite material

Keywords: - SI engine piston Static structural analysis, steady state thermal analysis, CATIA V5, ANSYS.

INTRODUCTION: Engine being the most important component of the power train of the vehicle and supplies energy to the different components after converting it into various forms. Engine consists of various mechanisms and components induced in it for different functioning. Piston is one of them which is connected to the cam shaft is responsible for all the strokes in an engine which includes intake, Compression, Expansion and exhaust. Piston of IC engine is used in today's industry is basically made up of Al-alloy. It is also a moving component that is contained by the cylinder. The main purpose of piston is to transfer force which is generated by the expanding gas to crankshaft through the connecting rod. The fatigue failure occurs in the piston by the effect of cyclic gas pressure and the inertia forces. Piston head is kept at a highest stress concentration Main reason for the fatigue failure is stress concentration.

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