

Design and Analysis of a Piston by using AlSiC Composite Material

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Abstract

The work is carried out to measure the stress ,temperature distribution and ware rate of a piston which is made of Aluminium silicon carbide (AlSiC).

Piston is an integral part of a engine which reciprocates at very high speed thus it produces the resultant movement in the vehicle. It is a moving component that is contained by a cylinder and is made gas-tight by piston rings piston that transfers the combustion gas power to connecting rod to improve the efficiency of the engine there is a need to study about the pistons . Piston that are usually made up with aluminium alloy and alloy steels that shows a great resistance against thermal loads and structural loads. Thermal and mechanical stress assumes a conspicuous part in the design of piston.

There are lots of research works proposing, for engine pistons, new geometries , new materials and manufacturing techniques and this evolutions has undergone with a continuous developments over the last decades and required through examination of small details as compared and not withstanding all these studies ,there are many no. of damaged pistons . Damage mechanics have different origins and are mainly wear, temperature and fatigue related. Composite material are gaining importance for their advantages including low cost, ease and simplicity of operation.

A model of a piston was made using NX 11 and the analysis like thermal , structural was done ANYSY 18.1 compared to Al alloy, Aluminium silicon carbide has better abrasion resistance , creep resistance , dimensional stability ,exceptionally good stiffness to weight ratio and better high temperature performance. Fabrication of piston using AlSiC is also easier than using aluminium.

Key words : piston, modelling, composite - Aluminium silicon carbide, thermal analysis, stress analysis .