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The Structural and Thermal Analysis of Two Different Composition Piston Geometry using Finite Element Method

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Abstract : In this study, static structural analysis and thermal analysis were investigated on a conventional diesel piston, made of aluminum silicon alloy. The usage of Al-SiC Metal Matrix Composites was constantly increasing in the last years due to their unique properties such as light weight, high strength, high specific modulus, high fatigue strength, high hardness and low density. Al-SiC composites of various carbide compositions were produced using a centrifugal casting machine and stir casting machine. The mechanical properties, hardness, tensile strength, yield stress and elongation were studied in order to determine the optimum strength of the metal matrix composites. Scanning electron microscopy was used to study the microstructure-property correlation. It was observed that the tensile and hardness of the composites increased as the proportion of silicon carbide became higher in the composites. Also with increasing proportion of silicon carbide in the composite, the material became harder and appeared to have smaller values for total displacement and total energy during impact testing.

Key words : Diesel piston, Carbide compositions, Microstructure-property, Silicon carbide, Impact testing.

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