Engine and Auxiliary Systems

Edited by
Prof. Dr. A.K.M. Mohiuddin

IIUM PRESS
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
Engine and Auxiliary Systems

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Production of Aluminum-Silicon Carbide Composites Using Powder Metallurgy at Sin Temperatures above the Aluminum Melting Point Part II

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Introduction

Among various metal matrix composite systems, aluminum alloy composites aluminum reinforced with silicon carbide particles has attracted an attention in automotive aerospace applications due to their superior strength-to-weight ratio and high tensile strength. However, the widespread use of such composites is still largely unrealized due to limited knowledge of the processin-microstructure-property relationship in such materials. In automotive industry, these materials have been used as pistons, piston ring inserts, cylinder liners, brake rotors, brake pads, and connecting rods. A new developed pin-fin substrates made of AlSiC for liquid-cooled high-power module system used in hybrid electric vehicle (HEV) in technologies.

As we know, composite materials are designed to have the high strength and stiffness yet low in density. Composite materials are fabricated from combination of matrix and reinforcement. Reinforcement which is also known particulate-reinforced has contributes hardness in composite materials. Aluminum is used widely as a structural material especially in the aerospace industry because of its lightweight properties however the low strength and melting point of aluminum were always a problem. A cheap method of solving these problems was to use a reinforced element such as SiC particles and whiskers. The ceramic particulate additions make it possible to increase the specific elastic modulus of aluminum and improve its thermal properties.

Powder metallurgy (PM) method can help us to produce aluminum composites reinforced with SiC particulates produce a homogenous distribution of reinforcement in the matrix. Powder metallurgy also has the advantage of producing net-shape components minimizing machining process which is a great problem in case of aluminum silicon carbide composite as a result