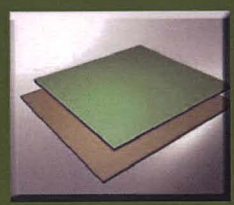
ADVANCES IN COMPOSITE MATERIALS



Iskandar Idris Yaacob
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IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Iskandar Idris Yaacob, Md Abdul Maleque & Zahurin Halim: Advances in Composite Materials.

ISBN: 978-967-418-231-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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Chapter 002

Technology of Moulding for Composite Auto Brake Rotor

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Keywords: Sand mold, permanent mold, composite material, brake rotor.

Abstract: The mold preparation for composite automotive brake rotor plays an important role as a pressure transmitting medium that ensured an excellent shape with good mechanical properties, resulting from zero porosity and fine microstructure. The production parameters such as casting complex shapes, cost, good surface finish and mechanical properties are need to be considered for the preparation of mold. In this chapter, a systematic mold preparation procedure has been proposed with the comparison between oil tempered sand and permanent mold. From the study it is believed that the oil tempered sand mold could be a better choice as it produces surface quality close to permanent mold as a result of the lower gas evolution characteristics of oil which allows for the use of finer grain for the production of auto brake rotor with flexible casting shapes and lower cost.

Introduction

Molding is a process that consists of different operations essential to develop a mold for receiving molten metal. Generally the foundry molds are made of sand grains bonded together to form the desired shape of the casting. Sand is used because it is cheap, resists deformation when heated; it offers a great variety of casting sizes and complexities. It also offers the added advantage of reuse of a large portion of the sand in future molds. Preparation of mold for composite materials application in automotive industry is an essential process that determines the quality of the cast component. In general, molded parts represent more than 70% of the engineering products. Identifying mold materials for the casting of aluminium matrix composite (AMC) will have significant effect in terms of economical production of aluminium alloys. Aluminium alloys are quite attractive in the automotive industry because it achieves a reduction in weight and also due to their low density, their capability to be strengthened by precipitation, their good corrosion resistance, high thermal and electrical conductivity and their high damping capacity.

Aluminium matrix composites (AMCs) have been widely studied for many applications such as aerospace, automotive industries, sporting equipment, space shuttle, electronic packaging, and armors [1-3]. Many iron and steel components like piston, cylinder heads, engine blocks and intake manifold have also been replaced with composite materials. In terms of weight, aluminium matrix composite brake rotor designs provide up to a 60 % reduction when compared to cast iron [4]. In addition, aluminum matrix composite rotors outperform their iron counterparts in terms of their mechanical properties and practical use.