

Engine and Auxiliary Systems

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



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Engine and Auxiliary Systems

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



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

A.K.M. Mohiuddin
Engine and Auxiliary Systems
A.K.M. Mohiuddin

ISBN: 978-967-418-216-8

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

Table of Contents

Preface	iv
Table of Contents	v
Chapter 1	
<i>Experimental analysis and comparison of performance characteristics of catalytic converters</i> A.K.M. Mohiuddin	1
Chapter 2	
<i>Experimental analysis and simulation of catalytic converters</i> A.K.M. Mohiuddin	8
Chapter 3	
<i>Thermal design of mechanical devices using expert system</i> A.K.M. Mohiuddin	14
Chapter 4	
<i>Exhaust system optimization using GT- Power</i> A.K.M. Mohiuddin	21
Chapter 5	
<i>Experimental analysis to determine the relationship between noise and back pressure for muffler design – Part I: Muffler design requirements</i> A.K.M. Mohiuddin	29
Chapter 6	
<i>Experimental analysis to determine the relationship between noise and back pressure for muffler design – Part II: Experimental results</i> A.K.M. Mohiuddin	36
Chapter 7	
<i>2nd Generation IIUM Buggy Car – Part I: Design</i> A.K.M. Mohiuddin	42
Chapter 8	
<i>2nd Generation IIUM Buggy Car – Part II: Fabrication</i> A.K.M. Mohiuddin	48
Chapter 9	
<i>Robust design optimization of valve timing using multi-objective genetic algorithm (MOGA)</i> A.K.M. Mohiuddin and Yap Haw Shin	53
Chapter 10	
<i>A study of an aftermarket voltage stabilizer for its performance and emission on passengers vehicle</i> A.K.M. Mohiuddin, Sany Izan Ihsan and Noor Azammi Abd Murat	60

Chapter 11		
	<i>Investigation of engine performance using designed swirl adapter</i>	67
	A.K.M. Mohiuddin	
Chapter 12		
	<i>Comparison of various types of powertrain used in automotive vehicles in terms of performance and emission</i>	74
	A.K.M. Mohiuddin and Ali Faiz	
Chapter 13		
	<i>Automotive catalytic converters: Current status and some future perspectives</i>	80
	A.K.M. Mohiuddin and Jalal Mohammed Zayan	
Chapter 14		
	<i>3-Cylinder gasoline direct injection as opposed to 4-cylinder multi-port fuel injection for lower fuel consumption and NO_x emission</i>	86
	A.K.M. Mohiuddin and Anwar bin Mohd Sood	
Chapter 15		
	<i>Investigation of Spark Ignition Multipoint Engine Using Water Addition - Part I: Simulation</i>	92
	A.K.M. Mohiuddin and Mohammad Edilan Bin Mustaffa	
Chapter 16		
	<i>Investigation of Spark Ignition Multipoint Engine Using Water Addition - Part II: Performance and Emission</i>	101
	A.K.M. Mohiuddin and Mohammad Edilan Bin Mustaffa	
Chapter 17		
	<i>Thermodynamic Analysis of Combustion of CAMPRO CFE Engine – Part I: Simulation</i>	109
	A.K.M. Mohiuddin, Izzarief Bin Zahari and Abdullah Aiman	
Chapter 18		
	<i>Thermodynamic Analysis of Combustion of CAMPRO CFE Engine – Part II: Combustion Analysis</i>	116
	A.K.M. Mohiuddin, Izzarief Bin Zahari and Abdullah Aiman	
Chapter 19		
	<i>Development of Low Cost Catalytic Converter from Non-Precious Metals</i>	123
	A.K.M. Mohiuddin	
Chapter 20		
	<i>Performance Investigation of Energy Efficient Hybrid Engine towards Green Technology</i>	131
	Ataur Rahman	
Chapter 21		
	<i>Production of Aluminum-Silicon Carbide Composites Using Powder Metallurgy at Sintering Temperatures above the Aluminum Melting Point Part II</i>	138
	Yasin Nimir	
Chapter 22		
	<i>Comparison between composites reinforced with natural and synthetic fibers: Part I</i>	143
	Yasin Nimir	

Chapter 23		
	<i>Comparison between composites reinforced with natural fibres and synthetic fibres Part II</i>	151
	Yasin Nimir	
Chapter 24		
	<i>Production of Aluminium reinforced with SiC particulates using powder metallurgy</i>	156
	Yassin Nimir	
Chapter 25		
	<i>Development of automatic magnetic particle system for automotive parts inspection</i>	160
	Meftah Hrairi, Mohd Shah Bin Rizal, Salah Echrif	
Chapter 26		
	<i>Performance of an Automatic Magnetic Particle Inspection of Automotive Parts</i>	166
	Meftah Hrairi, Mohd Shah Bin Rizal, Salah Echrif	
Chapter 27		
	<i>Numerical simulation of complex turbulent flows</i>	172
	Asif Hoda	
Chapter 28		
	<i>Direct numerical simulation (DNS) and large eddy simulation (LES)</i>	177
	Asif Hoda	
Chapter 29		
	<i>Reynolds averaged navier stokes (RANS) Simulation</i>	182
	Asif Hoda	
Chapter 30		
	<i>Film Cooling of Turbine Blades</i>	192
	Asif Hoda	