Engine and Auxiliary Systems

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

IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

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

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Chapter 26

Performance of an Automatic Magnetic Particle Inspection of Automotive Parts

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Introduction

In the trend toward improvement of quality assurance, billions of parts per year are nondestructively tested for surface cracks in the automotive industry. This puts a lot of stress on both the automotive components manufacturing process and the human inspectors. In order to streamline the entire automotive components production system and to relieve inspector stress, it is necessary to inspect the components automatically based on computer vision systems [1]. An automated MPI system, much faster and more effective because it became a real-time system, has been developed [2]. In this system there are two subsystems, the software and the hardware. The hardware consists of an automation system that is responsible for movement of the camera, rotation of the tested work pieces and application of the magnetic particles. All of this mechanism will be controlled in automatic sequences by the software. The software system consists of the image processing algorithm and the control software which controls all the hardware movements [3]. The performance of the new MPI system will be discussed and results of comparisons to the previous system will be shown.

System Performance

Performance of Rotating Clamper System

To observe the performance of the rotating clamper, the specimen is divided into four parts diametrically; with each region being 90 degrees in angle. In this application, the diameter of the specimen is set within a range from minimum 15mm to maximum 100mm. The ranging is selected based on the field of view that the CCD camera can provide. For the experiment, a camshaft of 35mm in diameter is selected as a specimen. The time is taken region by region in sequence with the direction of rotation of the specimen (Figure 1). It is noted that the clampers rotate at constant speed. During MPI, the rotation of specimen is taken region by region, from region 1 to region 4. For simplification, each 90° region is marked by color of green, blue, red and yellow respectively.