ELECTRICAL AUTOMATION SYSTEMS TOWARDS INTELLIGENT AND ENERGY EFFICIENCY APPLICATIONS

Musse Mohamud Ahmed

IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

ELECTRICAL AUTOMATION SYSTEMS

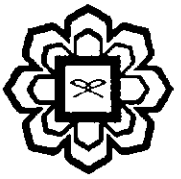
TOWARDS

INTELLIGENT AND ENERGY EFFICIENCY

APPLICATIONS

Musse Mohamud Ahmed

Electrical and Computer Engineering Department,
The Faculty of Engineering, IIUM



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

ISBN: 978-967-418-170-3

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
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

CONTENTS OF THE BOOK

Chapter Title & Author Page No

PART II: INTELLIGENT SYSTEMS USING COMMUNICATION AND ELECTRONICS SYSTEMS

PART III: ENERGY EFFICIENCY APPLICATIONS TO ELECTRIC MOTORS AND FAN MOTORS

CHAPTER 24

LOSSES OF ELECTRIC MOTORS

Musse Mohamud Ahmed, Noor Zatil Amali Bt Muhammad Hanapi and Che Fazilah Bt Fathil

Department of Electrical and Computer Engineering, Faculty of Engineering
International Islamic University Malaysia

This chapter discusses losses in electrical motors which include; no-load losses, load losses which can be classified further into stator losses, rotor losses and stray load losses.
Many variables are considered when energy efficient motors are designed for the world market. On the other hand, there are a lot of factors that influence the efficiency which are age, temperature; rewinding and load where of these contribute losses of useful energy of the motors.

24.1 Motor Losses

Even though Standard motors operate efficiently with typical efficiencies ranging from 83% to 92%, efficiency gains from only 92% to 94% results in a 25% reduction in losses [1]. There are two types of losses in electrical motor; no load and loaded losses. No load losses comprise of about 30% of all losses while loaded losses take up the remaining 70% of losses [2].

24.1.1 No Load Losses

No load losses comprise of about 30% of the total losses. The definition of no load loss is a fixed loss that occurs in an energized electrical motor regardless of the motor's load. There are mainly three types of no load losses [3].

1) Core or iron losses
   Comprise of hysteresis (a type of phenomenon caused by the domain wall movement in the steel during cyclical magnetization) and eddy current (the induced current in steel) losses. These losses occur in the motors magnetic circuit.

2) Friction and winding losses
   Comprise bearing friction, wind friction, the motor's cooling fan load, and any other source of friction or air movement in the motor. These losses are often appreciable in large and high-speed totally enclosed fan cooled motors. Friction and winding losses typically make up about 5% of total efficiency loss. Friction and winding losses are less problematic with the use of high quality bearings and lubricants, and improve fan designs.