

**THE INDUSTRIAL ELECTRONICS
HANDBOOK
(SECOND EDITION)
POWER ELECTRONICS AND MOTOR
DRIVES**



BOOK REVIEW BY DR. P. N. TEKWANI

Published by : CRC Press
Taylor & Francis Group

Edited by :

- (1) Bogdam M. Wilamowski
Author of 4 textbooks, 300 publications,
has 27 patents.
Presently with Auburn University, Alabama

- (2) J. David Irwin
Auburn University, Alabama

Some of the members of Editorial Board of the book:

Kamal Al-Haddad – Canada

Leopoldo Garcia Franquelo – Spain

Marian P. Kazmierkowski – Poland

Emil Levi – UK

Istvan Nagy – Hungary

M. A. Rahman – Canada

THE INDUSTRIAL ELECTRONICS HANDBOOK (SECOND EDITION)

This series has five books :

- (1) Fundamentals of Industrial Electronics
 - (2) Power Electronics and Motor Drives
 - (3) Control and Mechatronics
 - (4) Industrial Communication Systems
 - (5) Intelligent System
-

The Book (6 parts, 38 chapters, approx. 1000+ pages)

“Power Electronics and Motor Drives” closely follows the current research and trends in applications that can be found in IEEE Transactions on Industrial Electronics.

This fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics (TIE) journal, one of the largest and most reputed publications in the field.

This volume facilitates a necessary shift from low-power electronics to the high-power varieties used to control electromechanical systems and other industrial applications

In industrial environment, there is a need for high-power electronics that is used to control electromechanical systems in addition to the low-power electronics, typically employed for analog and digital systems.

Part-I : Focuses on special high-power semiconductor devices.

Part-I Semiconductor Devices

Thyristor

Power MOSFET

IGBT

GTO

IGCT

Power Diodes

SiC Schottky Diodes

SiC Power Switches

The most common interface between an electronic system and a moving mechanical system is an electric motor.

Part-II : Not only describes the various types of electric motors and their principles of operation, but covers their limitations as well.

Part-II Electrical Machines

AC Machine Windings

Multiphase AC Machines

Induction Motor

Permanent Magnet Machines

Permanent Magnet Synchronous Motor

Switched-Reluctance Motor

Thermal Effects

Noise and Vibrations of Rotating Electrical Machines

AC Electrical Machine Torque Harmonics

Since electrical power can be delivered in either AC or DC, there is a need for high-efficiency converters that perform the necessary process between these different types of powers. These aspects are covered in Part-III.

Part-III Conversion

Three-Phase AC-DC Converters

AC-to-DC Three-Phase/Switch/Level PWM Boost Converter: Design Modelling and Control

DC-DC Converters

DC-AC Converters

AC/AC Converters

Fundamentals of AC-DC-AC Converters Control and Applications

Power Supplies

Uninterruptible Power Supplies

Recent Trends in Multilevel Inverters (Contributed by - K. Gopakumar)

Resonant Converters

It is believed that electric motors represent the soul of the industry and as such play a fundamental role in our daily lives. This prominent position they occupy is a direct result of the fact that the majority of electric energy is consumed by electric motors. Therefore, it is important that the motors be efficient converters of electrical power into mechanical power and the drive mechanisms be efficient as well.

Part-IV is dedicated to a presentation of very specialized electronic circuits for the efficient control of electric motors.

Part-IV Motor Drives

Control of Converter-Fed Induction Motor Drives

Double-Fed Induction Machine Drives

Standalone Double-Fed Induction Generator

FOC: Field-Oriented Control

Adaptive Control of Electrical Drives

Drive Systems with Resilient Coupling

Multiscalar Model-Based Control System for AC

Machines

In addition to its use in electric motors, power electronics has many other applications, such as lighting, renewable energy conversion, and automotive electronics and these topics are covered in Part-V

Part-V Power Electronic Applications

Sustainable Lighting Technology

General Photo-Electro-Thermal Theory and Its Implications for Light-Emitting Diode Systems

Solar Power Conversion

Battery Management Systems for Hybrid Electric Vehicles

Electrical Loads in Automotive Systems

Plug-In Hybrid Electric Vehicles

The last part, Part-VI, deals with the power electronics that is employed in very high-power electrical systems for the transmission of energy.

Part-VI Power Systems

Three-Phase Electric Power Systems

Contactless Energy Transfer

Smart Energy Distribution

Flexible AC Transmission Systems

Filtering Techniques for Power Quality
Improvement

Each chapter of the book ends with a conclusion and contains list of references at the end.

Chapters are contributed by various experts (each chapter by one or more experts).

Each chapter has appropriate equations, figures tables and waveforms.

As the book contains mostly the excellent compilation from IEEE TIE papers, the information is very dense and demands reading of references for more clear understanding.

Hence, generally recommended for the starters with more relevant extra reading also.

It is the up-to-date collection of latest trends in the fields of Industrial Electronics.

The book contains 23 pages of index at the end.

THANK YOU
