

# Mechanical Design Of Electric Motors

The complexity of AC motor control lies in the multivariable and nonlinear nature of AC machine dynamics. Recent advancements in control theory now make it possible to deal with long-standing problems in AC motors control. This text expertly draws on these developments to apply a wide range of model-based control design methods to a variety of AC motors. Contributions from over thirty top researchers explain how modern control design methods can be used to achieve tight speed regulation, optimal energetic efficiency, and operation reliability and safety, by considering online state variable estimation in the absence of mechanical sensors, power factor correction, machine flux optimization, fault detection and isolation, and fault tolerant control. Describing the complete control approach, both controller and observer designs are demonstrated using advanced nonlinear methods, stability and performance are analysed using powerful techniques, including implementation considerations using digital computing means. Other key features:

- Covers the main types of AC motors including triphase, multiphase, and doubly fed induction motors, wound rotor,

permanent magnet, and interior PM synchronous motors • Illustrates the usefulness of the advanced control methods via industrial applications including electric vehicles, high speed trains, steel mills, and more • Includes special focus on sensorless nonlinear observers, adaptive and robust nonlinear controllers, output-feedback controllers, fault detection and isolation algorithms, and fault tolerant controllers This comprehensive volume provides researchers and designers and R&D engineers with a single-source reference on AC motor system drives in the automotive and transportation industry. It will also appeal to advanced students in automatic control, electrical, power systems, mechanical engineering and robotics, as well as mechatronic, process, and applied control system engineers.

Electric motors are the largest consumer of electric energy and they play a critical role in the growing market for electrification. Due to their simple construction, switched reluctance motors (SRMs) are exceptionally attractive for the industry to respond to the increasing demand for high-efficiency, high-performance, and low-cost electric motors with a more secure supply chain. Switched

**Reluctance Motor Drives: Fundamentals to Applications** is a comprehensive textbook covering the major aspects of switched reluctance motor drives. It provides an overview of the use of electric motors in the industrial, residential, commercial, and transportation sectors. It explains the theory behind the operation of switched reluctance motors and provides models to analyze them. The book extensively concentrates on the fundamentals and applications of SRM design and covers various design details, such as materials, mechanical construction, and controls. Acoustic noise and vibration is the most well-known issue in switched reluctance motors, but this can be reduced significantly through a multidisciplinary approach. These methodologies are explained in two chapters of the book. The first covers the fundamentals of acoustic noise and vibration so readers have the necessary tools to analyze the problems and explains the surface waves, spring-mass models, forcing harmonics, and mode shapes that are utilized in modeling and analyzing acoustic noise and vibration. The second applies these fundamentals to switched reluctance motors and provides examples for determining the sources of any

acoustic noise in switched reluctance motors. In the final chapter two SRM designs are presented and proposed as replacements for permanent magnet machines in a residential HVAC application and a hybrid-electric propulsion application. It also shows a high-power and compact converter design for SRM drives. Features: Comprehensive coverage of switched reluctance motor drives from fundamental principles to design, operation, and applications A specific chapter on electric motor usage in industrial, residential, commercial, and transportation applications to address the benefits of switched reluctance machines Two chapters address acoustic noise and vibration in detail Numerous illustrations and practical examples on the design, modeling, and analysis of switched reluctance motor drives Examples of switched reluctance motor and drive design The electric vehicle and plug-in hybrid electric vehicle play a fundamental role in the forthcoming new paradigms of mobility and energy models. The electrification of the transport sector would lead to advantages in terms of energy efficiency and reduction of greenhouse gas emissions, but would also be a great opportunity for the

introduction of renewable sources in the electricity sector. The chapters in this book show a diversity of current and new developments in the electrification of the transport sector seen from the electric vehicle point of view: first, the related technologies with design, control and supervision, second, the powertrain electric motor efficiency and reliability and, third, the deployment issues regarding renewable sources integration and charging facilities. This is precisely the purpose of this book, that is, to contribute to the literature about current research and development activities related to new trends in electric vehicle power trains.

**Electric Drives and Electromechanical Devices: Applications and Control, Second Edition**, presents a unified approach to the design and application of modern drive system. It explores problems involved in assembling complete, modern electric drive systems involving mechanical, electrical, and electronic elements. This book provides a global overview of design, specification applications, important design information, and methodologies. This new edition has been restructured to present a seamless, logical discussion on a wide range of topical problems relating

to the design and specification of the complete motor-drive system. It is organised to establish immediate solutions to specific application problem.

Subsidiary issues that have a considerable impact on the overall performance and reliability, including environmental protection and costs, energy efficiency, and cyber security, are also considered.

Presents a comprehensive consideration of electromechanical systems with insights into the complete drive system, including required sensors and mechanical components

Features in-depth discussion of control schemes, particularly focusing on

practical operation Includes extensive references to modern application domains

and real-world case studies, such as electric vehicles Considers the cyber aspects of drives, including networking and security

In this book, highly qualified scientists present their recent research motivated by the importance of electric machines. It

addresses advanced studies for high-speed electrical machine design, mechanical

design of rotors with surface-mounted permanent magnets, design of motor drive

for brushless DC motor, single-phase motors for household applications, battery electric propulsion systems for

competition racing applications, robust diagnosis by observer using the bond graph approach, a DC motor simulator based on virtual instrumentation, start-up of a PID fuzzy logic embedded control system for the speed of a DC motor using LabVIEW, advanced control of the permanent magnet synchronous motor and optimization of fuzzy logic controllers by particle swarm optimization to increase the lifetime in power electronic stages.

Various combinations of commercially available technologies could greatly reduce fuel consumption in passenger cars, sport-utility vehicles, minivans, and other light-duty vehicles without compromising vehicle performance or safety. Assessment of Technologies for Improving Light Duty Vehicle Fuel Economy estimates the potential fuel savings and costs to consumers of available technology combinations for three types of engines: spark-ignition gasoline, compression-ignition diesel, and hybrid. According to its estimates, adopting the full combination of improved technologies in medium and large cars and pickup trucks with spark-ignition engines could reduce fuel consumption by 29 percent at an additional cost of \$2,200 to the consumer. Replacing spark-ignition engines with

diesel engines and components would yield fuel savings of about 37 percent at an added cost of approximately \$5,900 per vehicle, and replacing spark-ignition engines with hybrid engines and components would reduce fuel consumption by 43 percent at an increase of \$6,000 per vehicle. The book focuses on fuel consumption--the amount of fuel consumed in a given driving distance--because energy savings are directly related to the amount of fuel used. In contrast, fuel economy measures how far a vehicle will travel with a gallon of fuel. Because fuel consumption data indicate money saved on fuel purchases and reductions in carbon dioxide emissions, the book finds that vehicle stickers should provide consumers with fuel consumption data in addition to fuel economy information.

**A COMPLETE GUIDE TO FLUID POWER PUMPS AND MOTORS** Written by an expert in the field of fluid power, this book provides proven methods for analyzing, designing, and controlling high-performance axial-piston swash-plate type machinery. **Fluid Power Pumps and Motors: Analysis, Design, and Control** offers a comprehensive mechanical analysis of hydrostatic machines and presents meticulous design guidelines for machine components. Detailed diagrams and

useful formulas are included throughout. Using the results and techniques employed in this practical resource will reduce product delivery lead-time and costs to increase overall efficiency. **COVERAGE INCLUDES:** Fluid properties | Fluid mechanics | Mechanical analysis Piston pressure | Steady-state results | Machine efficiency Designing a cylinder block, valve plate, piston, slipper, swash plate, and shaft | Displacement controlled pumps Pressure controlled pumps

**Heavy-Duty Electric Vehicles: From Concept to Reality** presents a step-by-step design and development guide for heavy-duty electric vehicles. It also offers practical insights based on the commercial application of an electric city bus. Heavy-duty electric vehicle design is challenging due to a lack of clear understanding of the government policies, R&D directions and uncertainty around the performance of various subsystems in an electric powertrain. Therefore, this book discusses key technical aspects of motors, power electronics, batteries and vehicle control systems, and outlines the system integration strategies necessary for design and safe operation of electric vehicles in practice. This comprehensive book serves as a guide to engineers and

decision makers involved in electric vehicle development programs and assists them in finding the suitable electric powertrain solution for a given heavy-duty vehicle application. Offers an overview of various standards and regulations that guide the electric vehicle design process and a comprehensive discussion on various government policies and incentive schemes propelling the growth of heavy electric vehicle markets across the world; Provides a comparative evaluation of different electric drivetrain concepts and a step-by-step power calculation guide for heavy-duty electric powertrain; Explains material selection and manufacturing methods for next generation batteries; Discusses key elements and design rules for creating a robust high voltage energy storage system, appropriate packaging and its support systems including charging network; Includes a concise description of torque mapping, power management and fault handling strategies for inverter drive and control systems; Features case studies to better understand complex topics like charging system requirements and vehicle control system diagnostics.

[Electric Motors and Drives](#)

[A Guide to Steppers, Servos, and Other Electrical Machines](#)

[Introduction to AC Machine Design](#)

[Mechanical Design](#)

[Brushless Permanent Magnet Motor Design](#)

[Electrical Machine Design](#)

[Heavy-Duty Electric Vehicles](#)

[Computer-aided Design of Electric](#)

[Machinery](#)

[Robust Advanced Design Techniques and](#)

[Applications](#)

[Electric Drives and Electromechanical](#)

[Systems](#)

[Reluctance Electric Machines](#)

**This monograph shows the reader how to avoid the burdens of sensor cost, reduced internal physical space, and system complexity in the control of AC motors. Many applications fields—electric vehicles, wind- and wave-energy converters and robotics, among them—will benefit. Sensorless AC Electric Motor Control describes the elimination of physical sensors and their replacement with observers, i.e., software sensors. Robustness is introduced to overcome problems associated with the unavoidable imperfection of knowledge of machine parameters—resistance, inertia, and so on—encountered in real systems. The details of a large number of speed- and/or position-sensorless ideas for different types of permanent-magnet synchronous motors and induction motors are presented along with several novel observer designs for electrical machines. Control strategies are developed using high-order, sliding-mode and quasi-continuous-sliding-mode techniques and two types of observer-controller schemes based on backstepping**

and sliding-mode techniques are described.

Experimental results validate the performance of these observer and controller configurations with test trajectories of significance in difficult sensorless-AC-machine problems. Control engineers working with AC motors in a variety of industrial environments will find the space-and-cost-saving ideas detailed in *Sensorless AC Electric Motor Control* of much interest. Academic researchers and graduate students from electrical, mechanical and control-engineering backgrounds will be able to see how advanced theoretical control can be applied in meaningful real systems.

*Electric Motors and Drives: Fundamentals, Types and Applications* provides information regarding the inner workings of motor and drive system. The book is comprised of nine chapters that cover several aspects and types of motor and drive systems.

Chapter 1 discusses electric motors, and Chapter 2 deals with power electronic converters for motor drives. Chapter 3 covers the conventional d.c. motors, while Chapter 4 tackles inductions motors - rotating field, slip, and torque. The book also talks about the operating characteristics of induction motors, and then deals with the inverter-fed induction motor drives. The stepping motor systems; the synchronous, switched reluctance, and brushless d.c. drives; and the motor/drive selection are also covered. The text will be of great use to individuals who wish to familiarize themselves with motor and drive systems.

Brushless permanent-magnet motors provide simple, low maintenance, and easily controlled mechanical power. Written by two leading experts on the

**subject, this book offers the most comprehensive guide to the design and performance of brushless permanent-magnetic motors ever written. Topics range from electrical and magnetic design to materials and control. Throughout, the authors stress both practical and theoretical aspects of the subject, and relate the material to modern software-based techniques for design and analysis. As new magnetic materials and digital power control techniques continue to widen the scope of the applicability of such motors, the need for an authoritative overview of the subject becomes ever more urgent. Design of Brushless Permanent-Magnet Motors fits the bill and will be read by students and researchers in electric and electronic engineering. "Focused on the design, analysis, construction, optimization, and applications of electric motors, this book can be used for regular or advanced mechanical engineering design courses. Mechanical Design of Electric Motors offers research results based on the personal experience of the author as well as the significant research contribution of others. It provides mechanical engineers and students of in energy conversion industries with comprehensive design techniques and practical approaches in the design of electric motors"--**

**Written for professionals who work in electric motors; this covers updated traction applications; the latest on solid-state motor-drive controllers; electrical and mechanical parameters; specifications; shapes; performance; protection; and more. -- The only book on the market that emphasizes machine design beyond the basic principles of AC and DC machine behavior AC electrical machine**

design is a key skill set for developing competitive electric motors and generators for applications in industry, aerospace, and defense. This book presents a thorough treatment of AC machine design, starting from basic electromagnetic principles and continuing through the various design aspects of an induction machine. Introduction to AC Machine Design includes one chapter each on the design of permanent magnet machines, synchronous machines, and thermal design. It also offers a basic treatment of the use of finite elements to compute the magnetic field within a machine without interfering with the initial comprehension of the core subject matter. Based on the author's notes, as well as after years of classroom instruction, Introduction to AC Machine Design: Brings to light more advanced principles of machine design—not just the basic principles of AC and DC machine behavior Introduces electrical machine design to neophytes while also being a resource for experienced designers Fully examines AC machine design, beginning with basic electromagnetic principles Covers the many facets of the induction machine design Introduction to AC Machine Design is an important text for graduate school students studying the design of electrical machinery, and it will be of great interest to manufacturers of electrical machinery. This is an introductory work explaining the principles, construction, and use of electric motors and their associated drive controls. It starts from basic physics and progresses to discuss state-of-the-art topics such as piezoelectric motors and vector control. It is largely non-mathematical in its approach and provides an uncluttered overview of

**the subject, easily accessible to beginning students in electrical and electronic engineering as well as engineers and scientists from other disciplines. This authoritative text is fully illustrated with precise, clear diagrams and photographs.**

**Controlling the level of noise in electrical motors is critical to overall system performance. However, predicting noise of an electrical motor is more difficult and less accurate than for other characteristics such as torque-speed. Recent advances have produced powerful computational methods for noise prediction, and Noise of Polyphase Electric Motors is the first book to collect these advances in a single source. It is also the first to include noise prediction for permanent magnet (PM) synchronous motors. Complete coverage of all aspects of electromagnetic, structural, and vibro-acoustic noise makes this a uniquely comprehensive reference. The authors begin with the basic principles of noise generation and radiation, magnetic field and radial forces, torque pulsations, acoustic calculations, as well as noise and vibration of mechanical and acoustic origin. Moving to applications, the book examines in detail stator system vibration analysis including the use of finite element method (FEM) modal analysis; FEM for radial pressure and structural modeling; boundary element methods (BEM) for acoustic radiation; statistical energy analysis (SEA); instrumentation including technologies, procedures, and standards; and both passive and active methods for control of noise and vibration. Noise of Polyphase Electric Motors gathers the fundamental concepts along with all of the analytical, numerical, and statistical methods into a**

**unified reference. It supplies all of the tools necessary to improve the noise performance of electrical motors at the design stage.**

**[Practical Electric Motor Handbook](#)**

**[Design, Simulation and Control](#)**

**[Electric Motor Handbook](#)**

**[Advanced Design Techniques and Applications](#)**

**[Switched Reluctance Motors and Their Control](#)**

**[Permanent Magnet Brushless DC Motor Drives and Controls](#)**

**[Switched Reluctance Motor Drives](#)**

**[Electric Machines for Smart Grids Applications](#)**

**[Industrial Motor Control](#)**

**[Variable Frequency AC Motor Drive Systems](#)**

**[Fundamentals to Applications](#)**

In this book, highly qualified multidisciplinary scientists grasp their recent researches motivated by the importance of artificial neural networks. It addresses advanced applications and innovative case studies for the next-generation optical networks based on modulation recognition using artificial neural networks, hardware ANN for gait generation of multi-legged robots, production of high-resolution soil property ANN maps, ANN and dynamic factor models to combine forecasts, ANN parameter recognition of engineering constants in Civil Engineering, ANN electricity consumption and generation forecasting, ANN for advanced process control, ANN breast cancer detection, ANN applications in biofuels, ANN modeling for manufacturing process optimization, spectral interference correction using a large-size spectrometer and ANN-based deep learning, solar radiation ANN prediction using NARX model, and ANN data assimilation for an atmospheric general

circulation model.

Presents applied theory and advanced simulation techniques for electric machines and drives This book combines the knowledge of experts from both academia and the software industry to present theories of multiphysics simulation by design for electrical machines, power electronics, and drives. The comprehensive design approach described within supports new applications required by technologies sustaining high drive efficiency. The highlighted framework considers the electric machine at the heart of the entire electric drive. The book also emphasizes the simulation by design concept—a concept that frames the entire highlighted design methodology, which is described and illustrated by various advanced simulation technologies. Multiphysics Simulation by Design for Electrical Machines, Power Electronics and Drives begins with the basics of electrical machine design and manufacturing tolerances. It also discusses fundamental aspects of the state of the art design process and includes examples from industrial practice. It explains FEM-based analysis techniques for electrical machine design—providing details on how it can be employed in ANSYS Maxwell software. In addition, the book covers advanced magnetic material modeling capabilities employed in numerical computation; thermal analysis; automated optimization for electric machines; and power electronics and drive systems. This valuable resource: Delivers the multi-physics know-how based on practical electric machine design methodologies Provides an extensive overview of electric machine design optimization and its integration with power electronics and drives

Incorporates case studies from industrial practice and research and development projects Multiphysics Simulation by Design for Electrical Machines, Power Electronics and Drives is an incredibly helpful book for design engineers, application and system engineers, and technical professionals. It will also benefit graduate engineering students with a strong interest in electric machines and drives.

This book introduces the subject of total design, and introduces the design and selection of various common mechanical engineering components and machine elements. These provide "building blocks", with which the engineer can practice his or her art. The approach adopted for defining design follows that developed by the SEED (Sharing Experience in Engineering Design) programme where design is viewed as "the total activity necessary to provide a product or process to meet a market need." Within this framework the book concentrates on developing detailed mechanical design skills in the areas of bearings, shafts, gears, seals, belt and chain drives, clutches and brakes, springs and fasteners. Where standard components are available from manufacturers, the steps necessary for their specification and selection are developed. The framework used within the text has been to provide descriptive and illustrative information to introduce principles and individual components and to expose the reader to the detailed methods and calculations necessary to specify and design or select a component. To provide the reader with sufficient information to develop the necessary skills to repeat calculations and selection processes, detailed examples and worked solutions are supplied

throughout the text. This book is principally a Year/Level 1 and 2 undergraduate text. Pre-requisite skills include some year one undergraduate mathematics, fluid mechanics and heat transfer, principles of materials, statics and dynamics. However, as the subjects are introduced in a descriptive and illustrative format and as full worked solutions are provided, it is possible for readers without this formal level of education to benefit from this book. The text is specifically aimed at automotive and mechanical engineering degree programmes and would be of value for modules in design, mechanical engineering design, design and manufacture, design studies, automotive power-train and transmission and tribology, as well as modules and project work incorporating a design element requiring knowledge about any of the content described. The aims and objectives described are achieved by a short introductory chapters on total design, mechanical engineering and machine elements followed by ten chapters on machine elements covering: bearings, shafts, gears, seals, chain and belt drives, clutches and brakes, springs, fasteners and miscellaneous mechanisms. Chapters 14 and 15 introduce casings and enclosures and sensors and actuators, key features of most forms of mechanical technology. The subject of tolerancing from a component to a process level is introduced in Chapter 16. The last chapter serves to present an integrated design using the detailed design aspects covered within the book. The design methods where appropriate are developed to national and international standards (e.g. ANSI, ASME, AGMA, BSI, DIN, ISO). The first edition of this text introduced a variety of machine elements as building

blocks with which design of mechanical devices can be undertaken. The approach adopted of introducing and explaining the aspects of technology by means of text, photographs, diagrams and step-by-step procedures has been maintained. A number of important machine elements have been included in the new edition, fasteners, springs, sensors and actuators. They are included here. Chapters on total design, the scope of mechanical engineering and machine elements have been completely revised and updated. New chapters are included on casings and enclosures and miscellaneous mechanisms and the final chapter has been rewritten to provide an integrated approach. Multiple worked examples and completed solutions are included.

Electric energy is arguably a key agent for our material prosperity. With the notable exception of photovoltaic generators, electric generators are exclusively used to produce electric energy from mechanical energy. More than 60% of all electric energy is used in electric motors for useful mechanical work in various industries. This book presents the modeling, performance, design, and control of reluctance synchronous and flux-modulation machines developed for higher efficiency and lower cost. It covers one- and three-phase reluctance synchronous motors in line-start applications and various reluctance flux-modulation motors in pulse width modulation converter-fed variable speed drives. "Reluctance motor drives start to find their rightful place in the adjustable speed motor drives. This is in part due to their lower cost, ease of cooling, higher fault tolerance, and suitability for use under harsh operating and ambient condition.

The book by Prof. Boldea and Prof. Tutelea offers a physically insightful approach to electromechanical energy conversion in this family of electric machines. Authors provide an in-depth explanation of the electromagnetic performance, interdependence between control and magnetic design and fundamentals of design. I found this book to be a great resource for practicing engineers in industry and researchers in academia. There is an outstanding balance between the theoretical contents and engineering aspects of design and control throughout the manuscript which makes this book an excellent choice for a graduate course in academic institutions or series of short courses for practicing engineers in the industry. I would like to strongly recommend this book for researchers and practitioners in the area of electric machines." —Babak Fahimi, Distinguished Chair of Engineering at University of Texas at Dallas, USA Presents basic and up-to-date knowledge about the topologies, modeling, performance, design, and control of reluctance synchronous machines. Includes information on recently introduced reluctance flux-modulation electric machines (switched- flux, flux-reversal, Vernier, transverse flux, claw pole, magnetic-geared dual-rotor, brushless doubly fed, etc.). Features numerous examples and case studies throughout. Provides a comprehensive overview of all reluctance electric machines.

\*A complete, definitive source for the design, manufacture, application, and testing of small electric motors less than ten horsepower \*Gives motor design engineers, test technicians, and engineers top-to-bottom coverage of materials used in motor manufacturing, as well as how-to advice on selecting

the right design and assembly method \*Includes a full section on motor applications

AC motors. Power switching devices. The six step voltage source inverter for induction motors. The pulse width modulated voltage source inverter for induction motors. The six step current source inverter drive. The six step synchro-converto system for synchronous motors. The current source inverter for the capacitor self-excited induction motor. The cycloconverto. The slip energy recovery system for wound rotor induction motors.

In one complete volume, this essential reference presents an in-depth overview of the theoretical principles and techniques of electrical machine design. This timely new edition offers up-to-date theory and guidelines for the design of electrical machines, taking into account recent advances in permanent magnet machines as well as synchronous reluctance machines. New coverage includes: Brand new material on the ecological impact of the motors, covering the eco-design principles of rotating electrical machines An expanded section on the design of permanent magnet synchronous machines, now reporting on the design of tooth-coil, high-torque permanent magnet machines and their properties Large updates and new material on synchronous reluctance machines, air-gap inductance, losses in and resistivity of permanent magnets (PM), operating point of loaded PM circuit, PM machine design, and minimizing the losses in electrical machines> End-of-chapter exercises and new direct design examples with methods and solutions to real design problems> A supplementary website hosts two machine design examples created with MATHCAD: rotor surface

magnet permanent magnet machine and squirrel cage induction machine calculations. Also a MATLAB code for optimizing the design of an induction motor is provided. Outlining a step-by-step sequence of machine design, this book enables electrical machine designers to design rotating electrical machines. With a thorough treatment of all existing and emerging technologies in the field, it is a useful manual for professionals working in the diagnosis of electrical machines and drives. A rigorous introduction to the theoretical principles and techniques makes the book invaluable to senior electrical engineering students, postgraduates, researchers and university lecturers involved in electrical drives technology and electromechanical energy conversion.

INDUSTRIAL MOTOR CONTROL 7E is an integral part of any electrician training. Comprehensive and up to date, this book provides crucial information on basic relay control systems, programmable logic controllers, and solid state devices commonly found in an industrial setting. Written by a highly qualified and respected author, you will find easy-to-follow instructions and essential information on controlling industrial motors and commonly used devices in contemporary industry. INDUSTRIAL MOTOR CONTROL 7E successfully bridges the gap between industrial maintenance and instrumentation, giving you a fundamental understanding of the operation of variable frequency drives, solid state relays, and other applications that employ electronic devices. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

[Design, Evaluation, Aging, Testing, and Repair](#)

[New Trends in Electrical Vehicle Powertrains](#)  
[Mechanical Design for the Stage](#)  
[Electric Motors and Their Controls](#)  
[Electric Motors & Control Techniques](#)  
[Brushless Motors](#)  
[Design of Electrical Machines](#)  
[From Concept to Reality](#)  
[Applications and Control](#)  
[Axial Flux Permanent Magnet Brushless Machines](#)  
[Mechanical Design of Electric Motors](#)

Electrical Machine Design caters to the requirements of undergraduate and postgraduate students of electrical engineering and industry novices. The authors have adopted a flow chart based approach to explain the subject. This enables an in-depth understanding of the design of different types of electrical machines with an appropriate introduction to basic design considerations and the magnetic circuits involved. The book aids students to prepare for various competitive exams through objective questions, worked-out examples and review questions in increasing order of difficulty. MATLAB and C programs and Finite Element simulations using Motor Solve, featured in the text offers a profound new perspective in understanding of automated design of electrical machines.

Scenic effects involving rotating turntables, tracking stage wagons, and the vertical movement of curtains and painted drops have become common in both Broadway and Regional theatre productions. The machines that drive these effects range from small pneumatic cylinders pushing loads of a few pounds an inch or two, to 40 horsepower winches running multi-ton scenery at speeds

6 feet per second or more. Usually this machinery is designed by theatre technicians specifically for a particular show's effect. Compared to general industry, this design process is short, often only a few days long, it is done by one person, design teams are rare, and it is done in the absence of reference material specifically addressing the issues involved. The main goal of this book is to remedy this last situation. Mechanical Design for the Stage will be a reference for you that will:

- \* provide the basic engineering formulas needed to predict the forces, torques, speeds, and power required by a given move
- \* give a technician a design process to follow which will direct their work from general concepts to specific detail as a design evolves, and
- \* show many examples of traditional stage machinery designs.

The book's emphasis will be on following standard engineering design and construction practices, and developing machines that are functional, efficient to build, easily maintained, and safe to use.

Experienced product designers are increasingly expected to be adept at incorporating a range of components into their designs. Students and experimenters too need to look beyond basic circuits and devices to achieve adequate design solutions. For those experienced in engineering design, this is the guide to electric motors. This book will allow engineers and designers to marry the technologies they know about with motor technology, and hence to incorporate motors into their products. Of the many good books on motors, such as *Electric Motors and Drives* by Hughes, none offer the engineering professional a tailored guide to motors taking into account their

expertise. This book fills that gap. Irving Gottlieb is a leading author of many books for practising engineers, technicians and students of electronic and electrical engineering. Practical approach with minimum theory  
Covers a core area ignored by many electronics texts  
Shows how to incorporate motors into electronic products  
Mechanical Vibrations, 6/e is ideal for undergraduate courses in Vibration Engineering. Retaining the style of its previous editions, this text presents the theory, computational aspects, and applications of vibrations in as simple a manner as possible. With an emphasis on computer techniques of analysis, it gives expanded explanations of the fundamentals, focusing on physical significance and interpretation that build upon students' previous experience. Each self-contained topic fully explains all concepts and presents the derivations with complete details. Numerous examples and problems illustrate principles and concepts.

AC motors play a major role in modern industrial applications. Squirrel-cage induction motors (SCIMs) are probably the most frequently used when compared to other AC motors because of their low cost, ruggedness, and low maintenance. The material presented in this book is organized into four sections, covering the applications and structural properties of induction motors (IMs), fault detection and diagnostics, control strategies, and the more recently developed topology based on the multiphase (more than three phases) induction motors. This material should be of specific interest to engineers and researchers who are engaged in the modeling, design, and implementation of control algorithms applied to induction

motors and, more generally, to readers broadly interested in nonlinear control, health condition monitoring, and fault diagnosis.

An advanced introduction to the simulation and hardware implementation of BLDC motor drives A thorough reference on the simulation and hardware implementation of BLDC motor drives, this book covers recent advances in the control of BLDC motor drives, including intelligent control, sensorless control, torque ripple reduction and hardware implementation. With the guidance of the expert author team, readers will understand the principle, modelling, design and control of BLDC motor drives. The advanced control methods and new achievements of BLDC motor drives, of interest to more advanced readers, are also presented. Focuses on the control of PM brushless DC motors, giving readers the foundations to the topic that they can build on through more advanced reading Systematically guides readers through the subject, introducing basic operational principles before moving on to advanced control algorithms and implementations Covers special issues, such as sensorless control, intelligent control, torque ripple reduction and hardware implementation, which also have applications to other types of motors Includes presentation files with lecture notes and Matlab 7 coding on a companion website for the book

Rapid increases in energy consumption and emphasis on environmental protection have posed challenges for the motor industry, as has the design and manufacture of highly efficient, reliable, cost-effective, energy-saving, quiet, precisely controlled, and long-lasting electric

motors. Suitable for motor designers, engineers, and manufacturers, as well

Axial Flux Permanent Magnet (AFPM) brushless machines are modern electrical machines with a lot of advantageous merits over their conventional counterparts. They are increasingly used in power generation, domestic appliances, industrial drives, electric vehicles, and marine propulsion drives and many other applications. This book deals with the analysis, construction, design, optimisation, control and applications of AFPM machines. The authors present their own research results, as well as significant research contributions made by others. This monograph will be of interest to electrical engineers and other engineers involved in the design and application of AFPM brushless machine drives. It will be an important resource for researchers and graduate students in the field of electrical machine and drives.

[An Introduction](#)

[Handbook of Small Electric Motors](#)

[Multiphysics Simulation by Design for Electrical Machines,](#)

[Power Electronics and Drives](#)

[Design and Control](#)

[Fundamentals, types and applications](#)

[AC Electric Motors Control](#)

[Sensorless AC Electric Motor Control](#)

[Advanced Applications for Artificial Neural Networks](#)

[Design of Rotating Electrical Machines](#)

[Induction Motors](#)

[Design of Brushless Permanent-magnet Motors](#)

***The First Maker-Friendly Guide to Electric Motors!***

***Makers can do amazing things with motors. Yes, they're***

***more complicated than some other circuit elements, but with this book, you can completely master them. Once you do, incredible new projects become possible. Unlike other books, Motors for Makers is 100% focused on what you can do. Not theory. Making. First, Matthew Scarpino explains how electric motors work and what you need to know about each major type: stepper, servo, induction, and linear motors. Next, he presents detailed instructions and working code for interfacing with and controlling servomotors with Arduino Mega, Raspberry Pi, and BeagleBone Black. All source code and design files are available for you to download from [motorsformakers.com](http://motorsformakers.com). From start to finish, you'll learn through practical examples, crystal-clear explanations, and photos. If you've ever dreamed of what you could do with electric motors, stop dreaming...and start making! Understand why electric motors are so versatile and how they work Choose the right motor for any project Build the circuits needed to control each type of motor Program motor control with Arduino Mega, Raspberry Pi, or BeagleBone Black Use gearmotors to get the right amount of torque Use linear motors to improve speed and precision Design a fully functional electronic speed control (ESC) circuit Design your own quadcopter Discover how electric motors work in modern electric vehicles--with a fascinating inside look at Tesla's patents for motor design and control! A general view of how computers can be used in electric-machinery analysis, as seen from the perspective of historical experience.***

***Brushless Motors: Magnetic Design, Performance and Control is an outgrowth of the author's two previous books on this subject. This book contains significant additional material covering further aspects of magnetic***

***design, performance, and electrical control. The primary goal of this book is to meet the needs of working engineers who have little or no experience in electric motor design and control. The book starts with basic concepts, provides intuitive reasoning for them, and gradually builds a set of understandable concepts that foster the development of usable knowledge. This book strives to provide a basis of knowledge that non-experts can use to develop practical expertise, making them more productive in their work and allowing them to productively explore other approaches to motor design, performance, and electrical control.***

***A fully expanded new edition documenting the significant improvements that have been made to the tests and monitors of electrical insulation systems **Electrical Insulation for Rotating Machines: Design, Evaluation, Aging, Testing, and Repair, Second Edition** covers all aspects in the design, deterioration, testing, and repair of the electrical insulation used in motors and generators of all ratings greater than fractional horsepower size. It discusses both rotor and stator windings; gives a historical overview of machine insulation design; and describes the materials and manufacturing methods of the rotor and stator winding insulation systems in current use (while covering systems made over fifty years ago). It covers how to select the insulation systems for use in new machines, and explains over thirty different rotor and stator winding failure processes, including the methods to repair, or least slow down, each process. Finally, it reviews the theoretical basis, practical application, and interpretation of forty different tests and monitors that are used to assess winding insulation condition, thereby helping machine users avoid unnecessary machine failures and reduce maintenance***

**costs. *Electrical Insulation for Rotating Machines: Documents the large array of machine electrical failure mechanisms, repair methods, and test techniques that are currently available Educates owners of machines as well as repair shops on the different failure processes and shows them how to fix or otherwise ameliorate them Offers chapters on testing, monitoring, and maintenance strategies that assist in educating machine users and repair shops on the tests needed for specific situations and how to minimize motor and generator maintenance costs Captures the state of both the present and past “art” in rotating machine insulation system design and manufacture, which helps designers learn from the knowledge acquired by previous generations An ideal read for researchers, developers, and manufacturers of electrical insulating materials for machines, Electrical Insulation for Rotating Machines will also benefit designers of motors and generators who must select and apply electrical insulation in machines.***

**[Noise of Polyphase Electric Motors](#)**

**[Mechanical Vibrations](#)**

**[Applications, Control and Fault Diagnostics](#)**

**[Motors for Makers](#)**

**[Fluid Power Pumps and Motors: Analysis, Design and Control](#)**

**[Electrical Insulation for Rotating Machines](#)**

**[Assessment of Fuel Economy Technologies for Light-Duty Vehicles](#)**

**[Magnetic Design, Performance, and Control of Brushless DC and Permanent Magnet Synchronous Motors](#)**