

# Handbook Of Condition Monitoring Springer

This concise, user-oriented and up-to-date desk reference offers a broad introduction to the fascinating world of medical technology, fully considering today's progress and further development in all relevant fields. The Springer Handbook of Medical Technology is a systemized and well-structured guideline which distinguishes itself through simplification and condensation of complex facts. This book is an indispensable resource for professionals working directly or indirectly with medical systems and appliances every day. It is also meant for graduate and post graduate students in hospital management, medical engineering, and medical physics.

This book provides readers with a guide to the use of Digital Twin in manufacturing. It presents a collection of fundamental ideas about sensor electronics and data acquisition, signal and image processing techniques, seamless data communications, artificial intelligence and machine learning for decision making, and explains their necessity for the practical application of Digital Twin in Industry. Providing case studies relevant to the manufacturing processes, systems, and sub-systems, this book is beneficial for both academics and industry professionals within the field of Industry 4.0 and digital manufacturing.

Mass production companies have become obliged to reduce their production costs and sell more products with lower profit margins in order to survive in competitive market conditions. The complexity and automation level of machinery are continuously growing. This development calls for some of the most critical issues that are reliability and dependability of automatic systems. In the future, machines will be monitored remotely, and computer-aided techniques will be employed to

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detect faults in the future, and also there will be unmanned factories where machines and systems communicate to each other, detect their own faults, and can remotely intercept their faults. The pioneer studies of such systems are fault diagnosis studies. Thus, we hope that this book will contribute to the literature in this regard.

In today's competitive climate the economies of production have become a critical factor for all manufacturing companies. For this reason, achieving cost-effective plant maintenance is highly important. In this context monitoring plays a vital role. The purpose of this book is to inform readers about techniques currently available in the field of condition monitoring, and the methodology used in their application. With contributions from experts throughout the world, the Handbook of Condition Monitoring addresses the four major technique areas in condition monitoring in addition to the latest developments in condition monitoring research. Significantly, the Handbook of Condition Monitoring includes the following features: comprehensive coverage of the full range of techniques and methodologies accepted knowledge and new developments both technical and managerial content. This is the essential reference book for maintenance technicians, engineers, managers and researchers as well as graduate students involved in manufacturing and mechanical engineering, and condition monitoring.

This book offers a valuable guide for practicing bridge engineers and graduate students in structural engineering; its main purpose is to present the latest concepts in bridge engineering in fairly easy-to-follow terms. The book provides details of easy-to-use computer programs for:

- Analysing slab-on-girder bridges for live load distribution.
- Analysing slab and other solid bridge components for live load distribution.
- Analysing and designing concrete deck slab overhangs of girder bridges under vehicular loads.

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Determining the failure loads of concrete deck slabs of girder bridges under concentrated wheel loads. In addition, the book includes extensive chapters dealing with the design of wood bridges and soil-steel bridges. Further, a unique chapter on structural health monitoring (SHM) will help bridge engineers determine the actual load carrying capacities of bridges, as opposed to their perceived analytical capacities. The chapter addressing structures made with fibre-reinforced polymers will allow engineers to design highly durable, economical and sustainable structures. This chapter also provides guidance on rehabilitating deteriorated structures with these new materials. The book also deals with the philosophy of bridge design without resorting to complex equations. Additional material to this book can be downloaded from <http://extras.springer.com>

This book is an introduction to health care as a complex adaptive system, a system that feeds back on itself. The first section introduces systems and complexity theory from a science, historical, epistemological, and technical perspective, describing the principles and mathematics. Subsequent sections build on the health applications of systems science theory, from human physiology to medical decision making, population health and health services research. The aim of the book is to introduce and expand on important population health issues from a systems and complexity perspective, highlight current research developments and their implications for health care delivery, consider their ethical implications, and to suggest directions for and potential pitfalls in the future.

This Handbook compiles advanced methods for materials measurement and characterization from the macroscopic to the nano-scale. Materials professionals need not only handbooks of materials data but clear guidelines and standards for how to measure the full spectrum of materials

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characteristics of new materials and systems. Since materials science forms a bridge between the more traditional fields of physics, engineering, and chemistry, unifying the varying perspectives and covering the full gamut of properties also serves a useful purpose. This handbook is the first dedicated to these practical and important considerations.

This handbook presents global research on health expectancies, a measure of population health that examines the interaction between quantity and quality of life. With data from Europe, North America, Asia, and beyond, it explains how to define and measure health and morbidity and how to integrate these measurements with mortality. Coverage first highlights long-term trends in longevity and health. It also considers variations across and within countries, inequalities, and social gaps as well as micro and macro-level determinants. Next, the handbook deals with the methodological aspects of calculating health expectancies. It compares results from different methods and introduces tools, such as decomposition tool for decomposing gaps, an attrition tool for attributing a medical cause to reported disability, and a tool for measuring policy impact on health expectancies. It introduces methods of forecasting health expectancies. The handbook then goes on to examine the synergies and/or trade-off between longevity and health as well as considers such topics as the compression versus the expansion of morbidity/disability and the health-survival paradox. The last section considers new concepts and dimensions of health and, more broadly, well being which can be used in summary measures of population health, including psychological factors. Researchers, clinicians, demographers, and health planners will find this handbook an essential resource to this increasingly important public health and social policy tool. It will help readers gain insight into changes in health over time as well as inequalities between countries,

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regions, and population subgroups.

This is a comprehensive book on the theories of artificial intelligence with an emphasis on their applications. It combines fuzzy logic and neural networks, as well as hidden Markov models and genetic algorithm, describes advancements and applications of these machine learning techniques and describes the problem of causality. This book should serve as a useful reference for practitioners in artificial intelligence.

This book provides readers with a snapshot of recent methods for non-stationary vibration analysis of machinery. It covers a broad range of advanced techniques in condition monitoring of machinery, such as mathematical models, signal processing and pattern recognition methods and artificial intelligence methods, and their practical applications to the analysis of nonstationarities. Each chapter, accepted after a rigorous peer-review process, reports on a selected, original piece of work presented and discussed at the International Conference on Condition Monitoring of Machinery in Non-Stationary Operations, CMMNO'2016, held on September 12 – 16, 2016, in Gliwice, Poland. The contributions cover advances in both theory and practice in a variety of subfields, such as: smart materials and structures; fluid-structure interaction; structural acoustics as well as computational vibro-acoustics and numerical methods. Further topics include: engines control, noise identification, robust design, flow-induced vibration and many others. By presenting state-of-the-art in predictive maintenance solutions and discussing important industrial issues the book offers a

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valuable resource to both academics and professionals and is expected to facilitate communication and collaboration between the two groups.

Computer Numerical Control (CNC) controllers are high value-added products counting for over 30% of the price of machine tools. The development of CNC technology depends on the integration of technologies from many different industries, and requires strategic long-term support. "Theory and Design of CNC Systems" covers the elements of control, the design of control systems, and modern open-architecture control systems. Topics covered include Numerical Control Kernel (NCK) design of CNC, Programmable Logic Control (PLC), and the Man-Machine Interface (MMI), as well as the major modules for the development of conversational programming methods. The concepts and primary elements of STEP-NC are also introduced. A collaboration of several authors with considerable experience in CNC development, education, and research, this highly focused textbook on the principles and development technologies of CNC controllers can also be used as a guide for those working on CNC development in industry.

Acoustic emission (AE) techniques have successfully been used for assuring the structural integrity of large rocket motorcases since 1963, and their uses have expanded to ever larger structures, especially as structural health monitoring (SHM) of large structures has become the most urgent task for engineering communities around the world. The needs for advanced AE monitoring methods are felt keenly by those dealing

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with aging infrastructures. Many publications have appeared covering various aspects of AE techniques, but documentation of actual applications of AE techniques has been mostly limited to reports of successful results without technical details that allow objective evaluation of the results. There are some exceptions in the literature. In this Special Issue of the Acoustics section of Applied Sciences, we seek contributions covering these exceptions cited here. Here, we seek contributions describing case histories of AE applications to large structures that have achieved the goals of SHM by providing adequate technical information supporting the success stories. Types of structures can include aerospace and geological structures, bridges, buildings, factories, maritime facilities, off-shore structures, etc. Experiences with AE monitoring methods designed and proven for large stru

The purpose of this book is to inform readers about techniques currently available in the field of condition monitoring, and the methodology used in their application. It addresses the four major technique areas in condition monitoring, in addition to the latest developments in condition monitoring research. It is an essential reference book for maintenance technicians, engineers, manager and researchers, as well as graduate students involved in manufacturing and mechanical engineering, and condition monitoring. Handbook of Condition Monitoring Techniques and Methodology Springer Science & Business Media

This book describes in detail different types of vibration signals and the signal processing methods, including

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signal resampling and signal envelope, used for condition monitoring of drivetrains. A special emphasis is placed on wind turbines and on the fact that they work in highly varying operational conditions. The core of the book is devoted to cutting-edge methods used to validate and process vibration data in these conditions. Key case studies, where advanced signal processing methods are used to detect failures of gearboxes and bearings of wind turbines, are described and discussed in detail. Vibration sensors, SCADA (Supervisory Control and Data Acquisition), portable data analyzers and online condition monitoring systems, are also covered. This book offers a timely guide to both researchers and professionals working with wind turbines (but also other machines), and to graduate students willing to extend their knowledge in the field of vibration analysis.

Continuous improvements in technological applications have allowed more opportunities to develop automated systems. This not only leads to higher success in smart data analysis, but it increases the overall probability of technological progression. The Handbook of Research on Machine Learning Innovations and Trends is a key resource on the latest advances and research regarding the vast range of advanced systems and applications involved in machine intelligence. Highlighting multidisciplinary studies on decision theory, intelligent search, and multi-agent systems, this publication is an ideal reference source for professionals and researchers working in the field of machine learning and its applications.

Global health is a rapidly emerging discipline with a

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transformative potential for public policy and international development. Emphasizing transnational health issues, global health aims to improve health and achieve health equity for all people worldwide. Its multidisciplinary scope includes contributions from many disciplines within and beyond the health sciences, including clinical medicine, public health, social and behavioral sciences, environmental sciences, economics, public policy, law and ethics. This large reference offers up-to-date information and expertise across all aspects of global health and helps readers to achieve a truly multidisciplinary understanding of the topics, trends as well as the clinical, socioeconomic and environmental drivers impacting global health. As a fully comprehensive, state-of-the-art and continuously updated, living reference, the Handbook of Global Health is an important, dynamic resource to provide context for global health clinical care, organizational decision-making, and overall public policy on many levels. Health workers, physicians, economists, environmental and social scientists, trainees and medical students as well as professionals and practitioners will find this handbook of great value.

This book presents concepts, methods and techniques to examine symptoms of faults and failures of structures, systems and components and to monitor functional performance and structural

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integrity. The book is organized in five parts. Part A introduces the scope and application of technical diagnostics and gives a comprehensive overview of the physics of failure. Part B presents all relevant methods and techniques for diagnostics and monitoring: from stress, strain, vibration analysis, nondestructive evaluation, thermography and industrial radiology to computed tomography and subsurface microstructural analysis. Part C covers the principles and concepts of technical failure analysis, illustrates case studies, and outlines machinery diagnostics with an emphasis on tribological systems. Part D describes the application of structural health monitoring and performance control to plants and the technical infrastructure, including buildings, bridges, pipelines, electric power stations, offshore wind structures, and railway systems. And finally, Part E is an excursion on diagnostics in arts and culture. The book integrates knowledge of basic sciences and engineering disciplines with contributions from research institutions, academe, and industry, written by internationally known experts from various parts of the world, including Europe, Canada, India, Japan, and USA.

Condition modelling and control is a technique used to enable decision-making in manufacturing processes of interest to researchers and practising engineering. Condition Monitoring and Control for Intelligent Manufacturing will be bought by

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researchers and graduate students in manufacturing and control and engineering, as well as practising engineers in industries such as automotive and packaging manufacturing.

Ultrasonic methods have been very popular in nondestructive testing and characterization of materials. This book deals with both industrial ultrasound and medical ultrasound. The advantages of ultrasound include flexibility, low cost, in-line operation, and providing data in both signal and image formats for further analysis. The book devotes 11 chapters to ultrasonic methods. However, ultrasonic methods can be much less effective with some applications. So the book also has 14 chapters catering to other or advanced methods for nondestructive testing or material characterization. Topics like structural health monitoring, Terahertz methods, X-ray and thermography methods are presented. Besides different sensors for nondestructive testing, the book places much emphasis on signal/image processing and pattern recognition of the signals acquired.

Vibrations and Acoustics: Measurement and Signal Analysis is the culmination of the author's more than two decades of teaching and research experience in these areas. It will serve as a source of reference for postgraduate students, researchers, academicians, practicing engineers and professionals in the field of vibration and acoustics.

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This book presents up-to-date knowledge of dynamic analysis in engineering world. To facilitate the understanding of the topics by readers with various backgrounds, general principles are linked to their applications from different angles. Special interesting topics such as statistics of motions and loading, damping modeling and measurement, nonlinear dynamics, fatigue assessment, vibration and buckling under axial loading, structural health monitoring, human body vibrations, and vehicle-structure interactions etc., are also presented. The target readers include industry professionals in civil, marine and mechanical engineering, as well as researchers and students in this area.

This book addresses a range of complex issues associated with condition monitoring (CM), fault diagnosis and detection (FDD) in smart buildings, wide area monitoring (WAM), wind energy conversion systems (WECSs), photovoltaic (PV) systems, structures, electrical systems, mechanical systems, smart grids, etc. The book's goal is to develop and combine all advanced nonintrusive CMFD approaches on a common platform. To do so, it explores the main components of various systems used for CMFD purposes. The content is divided into three main parts, the first of which provides a brief introduction, before focusing on the state of the art and major research gaps in the area of CMFD. The second part covers the step-by-step implementation

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of novel soft computing applications in CMFD for electrical and mechanical systems. In the third and final part, the simulation codes for each chapter are included in an extensive appendix to support newcomers to the field.

Condition Monitoring Using Computational Intelligence Methods promotes the various approaches gathered under the umbrella of computational intelligence to show how condition monitoring can be used to avoid equipment failures and lengthen its useful life, minimize downtime and reduce maintenance costs. The text introduces various signal-processing and pre-processing techniques, wavelets and principal component analysis, for example, together with their uses in condition monitoring and details the development of effective feature extraction techniques classified into frequency-, time-frequency- and time-domain analysis. Data generated by these techniques can then be used for condition classification employing tools such as: • fuzzy systems; rough and neuro-rough sets; neural and Bayesian networks; hidden Markov and Gaussian mixture models; and support vector machines.

Growth is one of the human body's most intricate processes: each body part or region has its own unique growth patterns. Yet at the individual and population levels, growth patterns are sensitive to adverse conditions, genetic predispositions, and environmental changes. And despite the body's capacity to compensate for these developmental setbacks, the effects

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may be far-reaching, even life-long. The Handbook of Growth and Growth Monitoring in Health and Disease brings this significant and complex field together in one comprehensive volume: impact of adverse variables on growth patterns; issues at different stages of prenatal development, childhood, and adolescence; aspects of catch-up growth, endocrine regulation, and sexual maturation; screening and assessment methods; and international perspectives. Tables and diagrams, applications to other areas of health and disease, and summary points help make the information easier to retain. Together, these 140 self-contained chapters in 15 sections [ok?] cover every area of human growth, including: Intrauterine growth retardation. Postnatal growth in normal and abnormal situations. Cells and growth of tissues. Sensory growth and development. Effects of disease on growth. Methods and standards for assessment of growth, and more. The Handbook of Growth and Growth Monitoring in Health and Disease is an invaluable addition to the reference libraries of a wide range of health professionals, among them health scientists, physicians, physiologists, nutritionists, dieticians, nurses, public health researchers, epidemiologists, exercise physiologists, and physical therapists. It is also useful to college-level students and faculty in the health disciplines, and to policymakers and health economists. During the last two decades, computer and information technologies have forced great changes in the ways businesses manage operations in meeting the desired quality of products and services, customer demands, competition, and other challenges. The Handbook of Computational Intelligence in Manufacturing and Production Management focuses on new developments in computational intelligence in areas such as forecasting, scheduling, production planning, inventory control, and aggregate planning, among others. This comprehensive collection of research provides cutting-

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edge knowledge on information technology developments for both researchers and professionals in fields such as operations and production management, Web engineering, artificial intelligence, and information resources management. This utterly comprehensive work is thought to be the first to integrate the literature on the physics of the failure of complex systems such as hospitals, banks and transport networks. It has chapters on particular aspects of maintenance written by internationally-renowned researchers and practitioners. This book will interest maintenance engineers and managers in industry as well as researchers and graduate students in maintenance, industrial engineering and applied mathematics.

This book constitutes the thoroughly refereed proceedings of the 4th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management, IC3K, held in Barcelona, Spain, in October 2012. The 29 best papers were carefully reviewed and selected from 347 submissions. The papers are organized in topical sections on knowledge discovery and information retrieval; knowledge engineering and ontology development; knowledge management and information sharing.

This book presents the most important tools, techniques, strategy and diagnostic methods used in industrial engineering. The current widely accepted methods of diagnosis and their properties are discussed. Also, the possible fruitful areas for further research in the field are identified.

Successful development of effective computational systems is a challenge for IT developers across sectors due to uncertainty issues that are inherently present within computational problems. Soft computing proposes one such solution to the problem of uncertainty through the application of generalized set structures including fuzzy sets, rough sets,

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and multisets. The Handbook of Research on Generalized and Hybrid Set Structures and Applications for Soft Computing presents double blind peer-reviewed and original research on soft computing applications for solving problems of uncertainty within the computing environment.

Emphasizing essential concepts on generalized and hybrid set structures that can be applied across industries for complex problem solving, this timely resource is essential to engineers across disciplines, researchers, computer scientists, and graduate-level students.

This book discusses condition based monitoring of rotating machines using intelligent adaptive systems. The book employs computational intelligence and fuzzy control principles to deliver a module that can adaptively monitor and optimize machine health and performance. This book covers design and performance of such systems and provides case studies and data models for fault detection and diagnosis.

The contents cover everything from optimal sensor positioning to fault diagnosis. The principles laid out in this book can be applied across rotating machinery such as turbines, compressors, and aircraft engines. The adaptive fault diagnostics systems presented can be used in multiple time and safety critical applications in domains such as aerospace, automotive, deep earth and deep water exploration, and energy.

A long required resource to turn to for reliable, up-to-date information on the continually evolving field of metrology. In two easily searched volumes, the Wiley Handbook of Metrology provides a clear overview of both the fundamentals of metrology and recent advances.

Although the most sophisticated fault diagnosis and condition monitoring systems have their origin in the aerospace and nuclear energy industries, their use is by

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no means restricted to such areas of 'high technology'. Modern machinery in most industrial plants is now so complex and expensive that mechanics find it increasingly difficult to detect failure by, for instance, recognising changes in sound 'signatures', and few plants can afford the luxury of regular 'stripping down'. Increasingly, therefore, early-warning devices are being employed in an effort to prevent catastrophic breakdown. This book provides the first co-ordinated compilation of fault diagnosis and condition monitoring devices. It proceeds in three logical steps. The early chapters deal with those conditions which contribute to deterioration and the consequent likely development of faults. The middle part of the book considers the various techniques of monitoring and discusses the criteria for their selection in different situations. The final chapters provide a guide to the interpretation of the information signals deriving from monitoring, relating to reliability science and the mathematics of probability, and thus providing decision data on which management can act.

Leading the way in this field, the Encyclopedia of Quantitative Risk Analysis and Assessment is the first publication to offer a modern, comprehensive and in-depth resource to the huge variety of disciplines involved. A truly international work, its coverage ranges across risk issues pertinent to life scientists, engineers, policy makers, healthcare professionals, the finance industry, the military and practising statisticians. Drawing on the expertise of world-renowned authors and editors in this field this title provides up-to-date material on drug safety, investment theory, public policy applications,

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transportation safety, public perception of risk, epidemiological risk, national defence and security, critical infrastructure, and program management. This major publication is easily accessible for all those involved in the field of risk assessment and analysis. For ease-of-use it is available in print and online.

Today's manufacturing systems are undergoing significant changes in the aspects of planning, production execution, and delivery. It is imperative to stay up-to-date on the latest trends in optimization to efficiently create products for the market. The Handbook of Research on Applied Optimization Methodologies in Manufacturing Systems is a pivotal reference source including the latest scholarly research on heuristic models for solving manufacturing and supply chain related problems. Featuring exhaustive coverage on a broad range of topics such as assembly ratio, car sequencing, and color constraints, this publication is ideally designed for practitioners seeking new comprehensive models for problem solving in manufacturing and supply chain management.

Hardbound. The need to reduce costs has generated a greater interest in condition monitoring in recent years.

The Handbook of Condition Monitoring gives an extensive description of available products and their usage making it a source of practical guidance supported by basic theory. This handbook has been designed to assist individuals within companies in the methods and devices used to monitor the condition of machinery and products.

It is with great pleasure that we welcome you to the

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inaugural World Congress on Engineering Asset Management (WCEAM) being held at the Conrad Jupiters Hotel on the Gold Coast from July 11 to 14, 2006. More than 170 authors from 28 countries have contributed over 160 papers to be presented over the first three days of the conference. Day four will be host to a series of workshops devoted to the practice of various aspects of Engineering Asset Management. WCEAM is a new annual global forum on the various multidisciplinary aspects of Engineering Asset Management. It deals with the presentation and publication of outputs of research and development activities as well as the application of knowledge in the practical aspects of: strategic asset management risk management in asset management design and life-cycle integrity of physical assets asset performance and level of service models financial analysis methods for physical assets reliability modelling and prognostics information systems and knowledge management asset data management, warehousing and mining condition monitoring and intelligent maintenance intelligent sensors and devices regulations and standards in asset management human dimensions in integrated asset management education and training in asset management and performance management in asset management. We have attracted academics, practitioners and scientists from around the world to share their knowledge in this important emerging transdiscipline that impacts on almost every aspect of daily life.

Provides an extensive, up-to-date treatment of techniques used for machine condition monitoring Clear

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and concise throughout, this accessible book is the first to be wholly devoted to the field of condition monitoring for rotating machines using vibration signals. It covers various feature extraction, feature selection, and classification methods as well as their applications to machine vibration datasets. It also presents new methods including machine learning and compressive sampling, which help to improve safety, reliability, and performance. Condition Monitoring with Vibration Signals: Compressive Sampling and Learning Algorithms for Rotating Machines starts by introducing readers to Vibration Analysis Techniques and Machine Condition Monitoring (MCM). It then offers readers sections covering: Rotating Machine Condition Monitoring using Learning Algorithms; Classification Algorithms; and New Fault Diagnosis Frameworks designed for MCM. Readers will learn signal processing in the time-frequency domain, methods for linear subspace learning, and the basic principles of the learning method Artificial Neural Network (ANN). They will also discover recent trends of deep learning in the field of machine condition monitoring, new feature learning frameworks based on compressive sampling, subspace learning techniques for machine condition monitoring, and much more. Covers the fundamental as well as the state-of-the-art approaches to machine condition monitoring guiding readers from the basics of rotating machines to the generation of knowledge using vibration signals Provides new methods, including machine learning and compressive sampling, which offer significant improvements in accuracy with reduced computational

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costs Features learning algorithms that can be used for fault diagnosis and prognosis Includes previously and recently developed dimensionality reduction techniques and classification algorithms Condition Monitoring with Vibration Signals: Compressive Sampling and Learning Algorithms for Rotating Machines is an excellent book for research students, postgraduate students, industrial practitioners, and researchers.

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