

Chapter 6 Predictive Maintenance Technologies

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Technology and Safety of Marine Systems John Wiley & Sons

Since the publication of the second edition in 2013, there has been an increasing interest in asset management globally, as evidenced by a series of international standards on asset management systems, to achieve excellence in asset management. This cannot be achieved without high-quality data and the tools for data interpretation. The importance of such requirements is widely recognized by industry. The third edition of this textbook focuses on tools for physical asset management decisions that are data driven. It also uses a theoretical foundation to the tools (mathematical models) that can be used to optimize a variety of key maintenance/replacement/reliability decisions. Problem sets with answers are provided at the end of each chapter. Also available is an extensive set of PowerPoint slides and a solutions manual upon request with qualified textbook adoptions. This new edition can be used in undergraduate or post-graduate courses on physical asset management.

Cryogenic Systems CRC Press

Reliability Analysis and Asset Management of Engineering Systems explains methods that can be used to evaluate reliability and availability of complex systems, including simulation-based methods. The increasing digitization of mechanical processes driven by Industry 4.0 increases the interaction between machines and monitoring and control systems, leading to increases in system complexity. For those systems the reliability and availability analyses are increasingly challenging, as the interaction between machines has become more complex, and the analysis of the flexibility of the production systems to respond to machinery failure may require advanced simulation techniques. This book fills a gap on how to deal with such complex systems by linking the concepts of systems reliability and asset management, and then making these solutions more accessible to industry by explaining the availability analysis of complex systems based on simulation methods that emphasize Petri nets. Explains how to use a monitoring database to perform important tasks including an update of complex systems reliability Shows how to diagnose probable machinery-based causes of system performance degradation by using a monitoring database and reliability estimates in an integrated way Describes practical techniques for the application of AI and machine learning methods to fault detection and diagnosis problems

Transforming to Industry 4.0 Standards John Wiley & Sons

Business and IT organizations are currently embracing new strategically sound concepts in order to be more customer-centric, competitive, and cognitive in their daily operations. While useful, the various software tools, pioneering technologies, as well as their unique contributions largely go unused due to the lack of information provided on their special characteristics. Novel Practices and Trends in Grid and Cloud Computing is a collection of innovative research on the key concerns of cloud computing and how they are being addressed, as well as the various technologies and tools empowering cloud theory to be participative, penetrative, pervasive, and persuasive. While highlighting topics including cyber security, smart technology, and artificial intelligence, this book is ideally designed for students, researchers, and business managers on the lookout for innovative IT solutions for all the business automation software and improvisations of computational technologies.

Photovoltaic Systems Springer

The effect of corrosion in the oil industry leads to the failure of parts. This failure results in shutting down the plant to clean the facility. The annual cost of corrosion to the oil and gas industry in the United States alone is estimated at \$27 billion (According to NACE International)—leading some to estimate the global annual cost to the oil and gas industry as exceeding \$60 billion. In addition, corrosion commonly causes serious environmental problems, such as spills and releases. An essential resource for all those who are involved in the corrosion management of oil and gas infrastructure, *Corrosion Control in the Oil and Gas Industry* provides engineers and designers with the tools and methods to design and implement comprehensive corrosion-management programs for oil and gas infrastructures. The book addresses all segments of the industry, including production, transmission, storage, refining and distribution. Selects cost-effective methods to control corrosion Quantitatively measures and estimates corrosion rates Treats oil and gas infrastructures as systems in order to avoid the impacts that changes to one segment if a corrosion management program may have on others Provides a gateway to more than 1,000 industry best practices and international standards

Modelling and Analysis Springer

This book presents the outcome of the European project "SERENA", involving fourteen partners as international academics, technological companies, and industrial factories, addressing the design and development of a plug-n-play end-to-end cloud architecture, and enabling predictive maintenance of industrial equipment to be easily exploitable by small and medium manufacturing companies with a very limited data analytics experience. Perspectives and new opportunities to address open issues on predictive maintenance conclude the book with some interesting suggestions of future research directions to continue the growth of the manufacturing intelligence.

Applications and Case Studies CRC Press

An Introduction to Predictive Maintenance Elsevier

Technology Evolution in Apparel Manufacturing CRC Press

This book details how to leverage big data style analytics to manage and coordinate the key issues in both energy supply and demand. It presents a detailed explanation of the underlying systems technology that enables big data in buildings and how this technology provides added cost benefit from efficiency, onsite solar, and electricity markets. It is a primer on Building Automation Systems Standards, web services and electricity markets and programs plus a complete tutorial on energy analytics hardware, software, and Internet-enabled offerings that energy managers must understand today.

Advanced Information Systems Engineering Workshops CRC Press

The deteriorating condition of federal facilities poses economic, safety, operational, and environmental risks to the federal government, to the achievement of the missions of federal agencies, and to the achievement of public policy goals. Primary factors underlying this deterioration are the age of federal facilities—about half are at least 50 years old—and decades of inadequate investment for their maintenance and repair. These issues are not new and there are no quick fixes.

However, the current operating environment provides both the impetus and the opportunity to place investments in federal facilities' maintenance and repair on a new, more sustainable course for the 21st Century. Despite the magnitude of investments, funding for the maintenance and repair of federal facilities has been inadequate for many years, and myriad projects have been deferred. Predicting Outcomes of Investments in Maintenance and Repair of Federal Facilities identifies processes and practices for transforming the current portfolio of federal facilities into one that is more economically, physically, and environmentally sustainable. This report addresses ways to predict or quantify the outcomes that can be expected from a given level of maintenance and repair investments in federal facilities or facilities' systems, and what strategies, measures, and data should be in place to determine the actual outcomes of facilities maintenance and repair investments.

Architectures, Methodologies, and Use-cases Elsevier

It's time once again to make much of a simple concept; that two groups with different names, languages and cultures might put aside their old habits, pettiness and grudges, recognize the overwhelming alignment of their most critical self-interests, and join their complementary strengths to achieve unprecedented peace, harmony and productivity. That's the concept behind total productive maintenance (TPM), where maintenance and production personnel cooperate to define, standardize, allocate and perform the tasks needed to maximize overall equipment effectiveness (OEE), which keeps equipment producing quality product at maximum efficiency and minimum lifecycle cost.

Enterprise Interoperability: Smart Services and Business Impact of Enterprise Interoperability Springer Nature

Research efforts in the past decade have led to considerable advances in the concepts and methods of smart manufacturing. Smart Manufacturing: Applications and Case Studies includes information about the key applications of these new methods, as well as practitioners' accounts of real-life applications and case studies. Written by thought leaders in the field from around the world, Smart Manufacturing: Applications and Case Studies is essential reading for graduate students, researchers, process engineers and managers. It is complemented by a companion book titled Smart Manufacturing: Concepts and Methods, which describes smart manufacturing methods in detail. Includes examples of applications of smart manufacturing in process industries Provides a thorough overview of the subject and practical examples of applications through well researched case studies Offers insights and accounts of first-hand experiences to motivate further implementations of the key concepts of smart manufacturing

Engineering Maintenance Springer

Everyday technology is constantly changing, and it's hard to keep up with it at times. What is all this talk about automation, STEM, analytics and super-computers, and how will it really affect my daily life at work and in the home? This book is a simple guide to everyday technology and analytics written in plain language. It starts with explaining how computer networks are increasing in speed so fast that we can do more in less time than ever before. It explains the analytical jargon in plain English and why robotics in the home will be aided by the new technology of the quantum computer. Richly furnished with over 200 illustrations, photos and with minimal equations, A Simple Guide to Technology and Analytics is a ready reference book for those times when you don't really understand the technology and analytics being talked about. It explains complicated topics such as automated character recognition in a very simple way, and has simple exercises for the reader to fully understand the technology (with answers at the back). It even has explanations on how home appliances work, which are very useful the next time you go shopping for a microwave or TV. Even the Glossary at the back can be used as a quick look-up explanation for those on the go.

Predicting Outcomes of Investments in Maintenance and Repair of Federal Facilities Elsevier

This book is an update and expansion of topics covered in Guidelines for Mechanical Integrity Systems (2006). The new book is consistent with Risk-Based Process Safety and Life Cycle approaches and includes details on failure modes and mechanisms. Also, example testing an inspection programs is included for various types of equipment and systems. Guidance and examples are provided for selecting and maintaining critical safety systems.

Digitalization of Power Markets and Systems Using Energy Informatics Wiley-ISTE

This thesis introduces a successfully designed and commissioned intelligent health monitoring system, specifically for use on any industrial robot, which is able to predict the onset of faults in the joints of the geared transmissions. However the developed embedded wireless condition monitoring system leads itself very well for applications on any power transmission equipment in which the loads and speeds are not constant, and access is restricted. As such this provides significant scope for future development. Three significant achievements are presented in this thesis. First, the development of a condition monitoring algorithm based on vibration analysis of an industrial robot for fault detection and diagnosis. The combined use of a statistical control chart with time-domain signal analysis for detecting a fault via an arm-mounted wireless processor system represents the first stage of fault detection. Second, the design and development of a sophisticated embedded microprocessor base station for online implementation of the intelligent condition monitoring algorithm, and third, the implementation of a discrete wavelet transform, using an artificial neural network, with statistical feature extraction for robot fault diagnosis in which the vibration signals are first decomposed into eight levels of wavelet coefficients.

Theory and Applications Food & Agriculture Org.

Of the more than \$300 billion spent on plant maintenance and operations, U.S. industry spends as much as 80 percent of this amount to correct chronic failures of machines, systems, and people. With machines and systems becoming increasingly complex, this problem can only worsen, and there is a clear and pressing need to establish comprehensive equi

Recent Improvements of Power Plants Management and Technology Elsevier

Traditionally society has regulated hazardous industries by detailed references to engineering codes, standards and hardware requirements. These days a risk-based approach is adopted. Risk analysis involves identifying hazards, categorizing the risks, and providing the necessary decision support to determine the necessary arrangements and measures to reach a "safe" yet economical operating level. When adopting such an approach the abundance of techniques available to express risk levels can often prove confusing and inadequate. This highly practical guide to safety and risk

analysis in Marine Systems not only adds to the current techniques available, but more importantly identifies instances where traditional techniques fall short. Uncertainties that manifest within risk analysis are highlighted and alternative solutions presented. In addition to risk analysis techniques this book addresses influencing elements including: reliability, Maintenance Decision making and Human error. The highly practical approach of this title ensures it is accessible to the widest possible audience

Robots, Drones, UAVs and UGVs for Operation and Maintenance BoD – Books on Demand

With its easy-to-read writing style, Productivity and Reliability-Based Maintenance Management provides a strong yet practical foundation on Total Productive Maintenance (TPM). This comprehensive practical guide departs from the wait-failure-emergency repair cycle that plagues many industries today. Instead, this text takes a proactive and productive maintenance approach, focusing on how to avoid failure in the first place. By using real-world case studies in every chapter, the author reinforces the importance of sound and proactive maintenance practices. The use of end-of-chapter problems and discussion questions helps to solidify concepts presented. Productivity and Reliability-Based Maintenance Management is a powerful educational tool for students as well as maintenance professionals and managers. This volume was previously published under the same title in 2004 by Pearson Education, and has been reprinted with permission through an arrangement with the author.

Reliability Analysis and Asset Management of Engineering Systems Apparel Resources Publication

Industrial assets (such as railway lines, roads, pipelines) are usually huge, span long distances, and can be divided into clusters or segments that provide different levels of functionality subject to different loads, degradations and environmental conditions, and their efficient management is necessary. The aim of the book is to give comprehensive understanding about the use of autonomous vehicles (context of robotics) for the utilization of inspection and maintenance activities in industrial asset management in different accessibility and hazard levels. The usability of deploying inspection vehicles in an autonomous manner is explained with the emphasis on integrating the total process. Key Features Aims for solutions for maintenance and inspection problems provided by robotics, drones, unmanned air vehicles and unmanned ground vehicles Discusses integration of autonomous vehicles for inspection and maintenance of industrial assets Covers the industrial approach to inspection needs and presents what is needed from the infrastructure end Presents the requirements for robot designers to design an autonomous inspection and maintenance system Includes practical case studies from industries

TPM Simplified Elsevier

In the fast-developing world of Industry 4.0, which combines Extended Reality (XR) technologies, such as Virtual Reality (VR) and Augmented Reality (AR), creating location aware applications to interact with smart objects and smart processes via Cloud Computing strategies enabled with Artificial Intelligence (AI) and the Internet of Things (IoT), factories and processes can be automated and machines can be enabled with self-monitoring capabilities. Smart objects are given the ability to analyze and communicate with each other and their human co-workers, delivering the opportunity for much smoother processes, and freeing up workers for other tasks. Industry 4.0 enabled smart

objects can be monitored, designed, tested and controlled via their digital twins, and these processes and controls are visualized in VR/AR. The Industry 4.0 technologies provide powerful, largely unexplored application areas that will revolutionize the way we work, collaborate and live our lives. It is important to understand the opportunities and impact of the new technologies and the effects from a production, safety and societal point of view.

Transmission, Distribution, and Renewable Energy Generation Power Equipment Packt Publishing Ltd

Industry 4.1 Intelligent Manufacturing with Zero Defects Discover the future of manufacturing with this comprehensive introduction to Industry 4.0 technologies from a celebrated expert in the field Industry 4.1: Intelligent Manufacturing with Zero Defects delivers an in-depth exploration of the functions of intelligent manufacturing and its applications and implementations through the Intelligent Factory Automation (iFA) System Platform. The book's distinguished editor offers readers a broad range of resources that educate and enlighten on topics as diverse as the Internet of Things, edge computing, cloud computing, and cyber-physical systems. You'll learn about three different advanced prediction technologies: Automatic Virtual Metrology (AVM), Intelligent Yield Management (IYM), and Intelligent Predictive Maintenance (IPM). Different use cases in a variety of manufacturing industries are covered, including both high-tech and traditional areas. In addition to providing a broad view of intelligent manufacturing and covering fundamental technologies like sensors, communication standards, and container technologies, the book offers access to experimental data through the IEEE DataPort. Finally, it shows readers how to build an intelligent manufacturing platform called an Advanced Manufacturing Cloud of Things (AMCoT). Readers will also learn from: An introduction to the evolution of automation and development strategy of intelligent manufacturing A comprehensive discussion of foundational concepts in sensors, communication standards, and container technologies An exploration of the applications of the Internet of Things, edge computing, and cloud computing The Intelligent Factory Automation (iFA) System Platform and its applications and implementations A variety of use cases of intelligent manufacturing, from industries like flat-panel, semiconductor, solar cell, automotive, aerospace, chemical, and blow molding machine Perfect for researchers, engineers, scientists, professionals, and students who are interested in the ongoing evolution of Industry 4.0 and beyond, Industry 4.1: Intelligent Manufacturing with Zero Defects will also win a place in the library of laypersons interested in intelligent manufacturing applications and concepts. Completely unique, this book shows readers how Industry 4.0 technologies can be applied to achieve the goal of Zero Defects for all product

BIG DATA and Building Technology Integration Springer Nature

The 'machines' as we see them today use certain level of technology which is contemporary to today's standards. In garment manufacturing, activities have been mechanized over a period of time and mechatronics and electronics are added to enable better productivity, repeatability of output and consistency of quality. In the last one-and-a-half decade, the integration of computer and information technology made the machines capable of generating, storing and transmitting data automatically with added ease of diagnostics and quick repair. The future will likely see these machines support sustainable practices while becoming energyefficient and caring for the environment. The book traces the evolution of technology for different garment manufacturing machinery and equipment and how the gradual improvement of features has supported the users.