Chapter 6 Predictive Maintenance Technologies | b2b2816835507ba223521f0bef9fd070

Crist Power Plant Case Study

Deliver unprecedented customer value and seize your competitive edge with a transformative digital supply network. Digital tech has disrupted life and business as we know it, and supply chain management is no exception. But how exactly does digital transformation affect your business? What are the breakthrough technologies and their capabilities you need to know about? How will digital transformation impact skills requirements and work in general?
Do you need to completely revamp your understanding of supply chain management? And most importantly: How do you get started? Digital Supply Networks provides clear answers to these and many other questions. Written by an experienced team comprised of Deloitte consultants and leading problem-driven scholars from a premier research university, this expert guide leads you through the process of improving operations building supply networks, increasing revenue, reimagining business models, and providing added value to customers, stakeholders, and society. You’ll learn everything you need to know about: Stages of development, roles, capabilities, and the benefits of DSN Big data analytics including its attributes, security, and authority Machine learning, Artificial Intelligence, Blockchain, robotics, and the Internet of Things Synchronized planning, intelligent supply, and digital product development Vision, attributes, technology, and benefits of smart manufacturing, dynamic logistics, and fulfillment A playbook to guide the digital transformation journey Drawing from real world-experience and problem-driven academic research, the authors provide an in-depth account of the transformation to digitally connected supply networks. They discuss the limitations of traditional supply chains and the underlying capabilities and potential of digitally-enabled supply flows. The chapters burst with expert insights and real-life use cases grounded in tomorrow’s industry needs. Success in today’s hyper-competitive, fast-paced business landscape, characterized by the risk of black swan events, such as the 2020 COVID-19 global pandemic, requires the reimagination and the digitalization of complex demand-supply systems, more collaborative and connected processes, and smarter, more dynamic data-driven decision making?which can only be achieved through a fully integrated Digital Supply Network.

**Drivepower**

Over recent years there have been substantial changes in those industries which are concerned with the design, purchase and use of special purpose (ie critical, high-revenue) rotating equipment. Key personnel have been the victims of early retirement or have moved to other industries: contractors and end-users have reduced their technical staff and consequently have to learn complex material ‘from scratch’. As a result, many companies are finding that they are devoting unnecessary man hours to the discovery and explanation of basic principles, and having to explain these to clients who should already be aware of them. In addition, the lack of understanding by contractors and users of equipment characteristics and operating systems often results in a ‘wrong fit’ and a costly reliability problem. Forsthoffer's Rotating Equipment Handbooks: Reliability Optimization through Component Condition Monitoring and Root Cause Analysis details the effective method of component condition monitoring for use as both a predictive
maintenance and root cause analysis tool. It also details the major failure causes, the author's proven root cause analysis procedure with exercises and case histories, installation, pre-commissioning planning, functional testing and commissioning, preventive maintenance strategies and more. Forsthoffer's Rotating Equipment Handbooks: Reliability Optimization through Component Condition Monitoring and Root Cause Analysis is the last title in the five volume set. The volumes are: 1. Fundamentals of Rotating Equipment; 2. Pumps; 3. Compressors; 4. Auxiliary Systems; 5. Reliability Optimization through Component Condition Monitoring and Root Cause Analysis. Part of a five volume set which is the distillation of many years of on-site training by a well-known US Engineer who also operates in the Middle East. A practical book written in a succinct style and well-illustrated throughout.

**Warranty and Preventive Maintenance for Remanufactured Products**

**An Introduction to Predictive Maintenance**

For anyone responsible for purchasing, servicing, or operating reciprocating compressors, this book discusses the theory of operation and explains how to install, troubleshoot, overhaul, and repair all types of compressors. This broad comprehensive text offers practical details on how to purchase, service, operate, and maintain compressors used in any of the process industries such as pulp and paper, mining, food processing, pharmaceuticals.

**E Source Technology Atlas Series**

Analyzing maintenance as an integrated system with objectives, strategies and processes that need to be planned, designed, engineered, and controlled using statistical and optimization techniques, the theme of this book is the strategic holistic system approach for maintenance. This approach enables maintenance decision makers to view maintenance as a provider of a competitive edge not a necessary evil. Encompassing maintenance systems; maintenance strategic and capacity planning, planned and preventive maintenance, work measurements and standards, material (spares) control, maintenance operations and control, planning and scheduling, maintenance quality, training, and others, this book gives readers an understanding of the relevant methodology and how to apply it to real-world problems in industry. Each chapter includes a number of exercises and is suitable as a textbook or a
reference for a professionals and practitioners whilst being of interest to industrial engineering, mechanical engineering, electrical engineering, and industrial management students. It can also be used as a textbook for short courses on maintenance in industry. This text is the second edition of the book, which has four new chapters added and three chapters are revised substantially to reflect development in maintenance since the publication of the first edition. The new chapters cover reliability centered maintenance, total productive maintenance, e-maintenance and maintenance performance, productivity and continuous improvement.

**Vibration Fundamentals**

In recent years, a considerable amount of effort has been devoted, both in industry and academia, to improving maintenance. Time is a critical factor in maintenance, and efforts are placed to monitor, analyze, and visualize machine or asset data in order to anticipate to any possible failure, prevent damage, and save costs. The MANTIS Book aims to highlight the underpinning fundamentals of Condition-Based Maintenance related conceptual ideas, an overall idea of preventive maintenance, the economic impact and technical solution. The core content of this book describes the outcome of the Cyber-Physical System based Proactive Collaborative Maintenance project, also known as MANTIS, and funded by EU ECSEL Joint Undertaking under Grant Agreement nº 662189. The ambition has been to support the creation of a maintenance-oriented reference architecture that support the maintenance data lifecycle, to enable the use of novel kinds of maintenance strategies for industrial machinery. The key enabler has been the fine blend of collecting data through Cyber-Physical Systems, and the usage of machine learning techniques and advanced visualization for the enhanced monitoring of the machines. Topics discussed include, in the context of maintenance: Cyber-Physical Systems, Communication Middleware, Machine Learning, Advanced Visualization, Business Models, Future Trends. An important focus of the book is the application of the techniques in real world context, and in fact all the work is driven by the pilots, all of them centered on real machines and factories. This book is suitable for industrial and maintenance managers that want to implement a new strategy for maintenance in their companies. It should give readers a basic idea on the first steps to implementing a maintenance-oriented platform or information system.

**Predictive Analytics and Data Mining**
Planning and Control of Maintenance Systems

Effective resource management and reliable equipment are essential for optimum plant performance. Computer Managed Maintenance Systems goes beyond the simple selection and implementation of a CMMS. It also defines the changes in infrastructure, management philosophy and employee skills that must be implemented to gain maximum benefits from the CMMS. The book is designed to address the information needs of all levels of plant management. In this new edition, the authors have added a chapter specifically on the latest technology, Application Solution Providers (ASP) that has revolutionized the way CMMS are used and the benefits they can offer to a business. This solution provides integrated software, hardware and networking technology along with Information Technology (IT) consulting services into an outsourced package. A new appendix on Key Performance Indicators has also been added. Comprehensive, practical guide that covers selection, justification, and implementation of an effective CMMS in any facility. All levels of plant management will find useful information in this step-by-step guide. Includes a new chapter on ASP technologies.
Motor Electrical Predictive Maintenance and Testing Series

Many readers already regard the Maintenance Planning and Scheduling Handbook as the chief authority for establishing effective maintenance planning and scheduling in the real world. The second edition adds new sections and further develops many existing discussions to make the handbook more comprehensive and helpful. In addition to practical observations and tips on such topics as creating a weekly schedule, staging parts and tools, and daily scheduling, this second edition features a greatly expanded CMMS appendix which includes discussion of critical cautions for implementation, patches, major upgrades, testing, training, and interfaces with other company software. Readers will also find a timely appendix devoted to judging the potential benefits and risks of outsourcing plant work. A new appendix provides guidance on the "people side" of maintenance planning and work execution. The second edition also has added a detailed aids and barriers analysis that improves the appendix on setting up a planning group. The new edition also features "cause maps" illustrating problems with a priority systems and schedule compliance. These improvements and more continue to make the Maintenance Planning and Scheduling Handbook a maintenance classic.

Reciprocating Compressors:

Practical Machinery Vibration Analysis and Predictive Maintenance

Machinery Vibration Analysis and Predictive Maintenance provides a detailed examination of the detection, location and diagnosis of faults in rotating and reciprocating machinery using vibration analysis. The basics and underlying physics of vibration signals are first examined. The acquisition and processing of signals is then reviewed followed by a discussion of machinery fault diagnosis using vibration analysis. Hereafter the important issue of rectifying faults that have been identified using vibration analysis is covered. The book also covers the other techniques of predictive maintenance such as oil and particle analysis, ultrasound and infrared thermography. The latest approaches and equipment used together with the latest techniques in vibration analysis emerging from current research are also highlighted. Understand the basics of vibration measurement Apply vibration analysis for different machinery faults Diagnose machinery-related problems with vibration analysis techniques
**Applied Predictive Analytics**

Put Predictive Analytics into Action Learn the basics of Predictive Analysis and Data Mining through an easy to understand conceptual framework and immediately practice the concepts learned using the open source RapidMiner tool. Whether you are brand new to Data Mining or working on your tenth project, this book will show you how to analyze data, uncover hidden patterns and relationships to aid important decisions and predictions. Data Mining has become an essential tool for any enterprise that collects, stores and processes data as part of its operations. This book is ideal for business users, data analysts, business analysts, business intelligence and data warehousing professionals and for anyone who wants to learn Data Mining. You’ll be able to: 1. Gain the necessary knowledge of different data mining techniques, so that you can select the right technique for a given data problem and create a general purpose analytics process. 2. Get up and running fast with more than two dozen commonly used powerful algorithms for predictive analytics using practical use cases. 3. Implement a simple step-by-step process for predicting an outcome or discovering hidden relationships from the data using RapidMiner, an open source GUI based data mining tool. Predictive analytics and Data Mining techniques covered: Exploratory Data Analysis, Visualization, Decision trees, Rule induction, k-Nearest Neighbors, Naïve Bayesian, Artificial Neural Networks, Support Vector machines, Ensemble models, Bagging, Boosting, Random Forests, Linear regression, Logistic regression, Association analysis using A priori and FP Growth, K-Means clustering, Density based clustering, Self Organizing Maps, Text Mining, Time series forecasting, Anomaly detection and Feature selection. Implementation files can be downloaded from the book companion site at www.LearnPredictiveAnalytics.com. Demystifies data mining concepts with easy to understand language Shows how to get up and running fast with 20 commonly used powerful techniques for predictive analysis Explains the process of using open source RapidMiner tools Discusses a simple 5 step process for implementing algorithms that can be used for performing predictive analytics Includes practical use cases and examples

**Technologies for Prehistoric & Historic Preservation**

Non-Destructive Testing and Condition Monitoring Techniques for Renewable Energy Industrial Assets integrates state-of-the-art information and discusses future developments and their significance to the improvement of the renewable energy industry. Renewable energy assets are complex systems with several critical components that
require inspection and adequate maintenance in order to ensure their high availability and uninterrupted operation. This is the first book to apply NDT and condition monitoring to these complex systems. Covers inspection and condition monitoring for a broad range of renewable energy systems, including wind turbines, wave energy devices, CSP and photovoltaic plants, and biofuel/biomass power plants. Includes a review of common types of NDT techniques. Discusses future developments in NDT and condition monitoring for renewable energy systems.

**Proactive Maintenance for Mechanical Systems**

**Electrical Power Equipment Maintenance and Testing**

The second edition of a bestseller, this definitive text covers all aspects of testing and maintenance of the equipment found in electrical power systems serving industrial, commercial, utility substations, and generating plants. It addresses practical aspects of routing testing and maintenance and presents both the methodologies and engineering basics needed to carry out these tasks. It is an essential reference for engineers and technicians responsible for the operation, maintenance, and testing of power system equipment. Comprehensive coverage includes dielectric theory, dissolved gas analysis, cable fault locating, ground resistance measurements, and power factor, dissipation factor, DC, breaker, and relay testing methods.

**Technology for the '90s**

**Industrial IoT Application Architectures and Use Cases**

This second edition of An Introduction to Predictive Maintenance helps plant, process, maintenance and reliability managers and engineers to develop and implement a comprehensive maintenance management program, providing proven strategies for regularly monitoring critical process equipment and systems, predicting machine failures, and scheduling maintenance accordingly. Since the publication of the first edition in 1990, there have been many changes.
Read Book Chapter 6 Predictive Maintenance Technologies

in both technology and methodology, including financial implications, the role of a maintenance organization, predictive maintenance techniques, various analyses, and maintenance of the program itself. This revision includes a complete update of the applicable chapters from the first edition as well as six additional chapters outlining the most recent information available. Having already been implemented and maintained successfully in hundreds of manufacturing and process plants worldwide, the practices detailed in this second edition of An Introduction to Predictive Maintenance will save plants and corporations, as well as U.S. industry as a whole, billions of dollars by minimizing unexpected equipment failures and its resultant high maintenance cost while increasing productivity. A comprehensive introduction to a system of monitoring critical industrial equipment Optimize the availability of process machinery and greatly reduce the cost of maintenance Provides the means to improve product quality, productivity and profitability of manufacturing and production plants

Fundamentals of Machine Learning for Predictive Data Analytics

An Updated Guide to Establishing Cutting-Edge Operations and Maintenance Procedures for Today's Complex Facilities An essential on-the-job resource, Facility Manager's Maintenance Handbook presents step-by-step coverage of the planning, design, and execution of operations and maintenance procedures for structures, equipment, and systems in any type of facility. This career-building reference provides the tools needed to streamline facility management processesreduce operational costsand ensure the effective utilization, maintenance, repair, and renovation of existing physical assets. Now with 40% new information, this Second Edition includes brand-new chapters on emergency response proceduresmaintenance operations benchmarkingcapital and operational budgets managementboiler and steam plant operations and other vital topics. The only book of its kind to cover both operations and maintenance, the updated Facility Manager's Maintenance Handbook features: Updated information on mechanical equipment and systems maintenance The latest fire protection procedures A comprehensive account of building codes Guidance on hazardous materials handling Excellent preparation for the IFMA Certified Facility Manager (CFM) qualification Inside This State-of-the-Art Facility Management Resource • Part 1: Organizing for Maintenance Operations • Part 2: Facility Operations and Maintenance • Operations Plans • Maintenance Plans • Part 3: Equipment and Systems Operations • Maintenance o Part 4: Facilities Emergency Preparedness o Part 5: Capital Investment
Collection Systems

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.

5. Forsthofer's Rotating Equipment Handbooks

Data Analytics Applied to the Mining Industry describes the key challenges facing the mining sector as it transforms into a digital industry able to fully exploit process automation, remote operation centers, autonomous equipment and the opportunities offered by the industrial internet of things. It provides guidelines on how data needs to be collected, stored and managed to enable the different advanced data analytics methods to be applied effectively in practice, through use of case studies, and worked examples. Aimed at graduate students, researchers, and professionals in the industry of mining engineering, this book: Explains how to implement advanced data analytics through case studies and examples in mining engineering Provides approaches and methods to improve data-driven decision making Explains a concise overview of the state of the art for Mining Executives and Managers Highlights and describes critical opportunity areas for mining optimization Brings experience and learning in digital transformation from adjacent sectors


An Industrial IoT Approach for Pharmaceutical Industry Growth, Volume Two uses an innovative approach to explore how the Internet of Things (IoT) and big data can improve approaches and make discoveries. Rapid growth of the IoT has encouraged many companies in the manufacturing sector to make use of this technology to unlock its potential.
Using clear language and real-world case studies, this book discusses systems level from both a human-factors point-of-view and the perspective of networking, databases, privacy and anti-spoofing. The wide variety in topics presented offers multiple perspectives on how to integrate the Internet of Things into pharmaceutical manufacturing. This book represents a useful resource for researchers in pharmaceutical sciences, information and communication technologies, and those who specialize in healthcare and pharmacovigilance. Emphasizes efficiency in pharmaceutical manufacturing through an IoT/Big Data approach Explores cutting-edge technologies through sensor enabled environments in the pharmaceutical industry Discusses system levels from both a human-factors point-of-view and the perspective of networking, databases, privacy and anti-spoofing

**Facility Manager's Maintenance Handbook**

This book shows how condition monitoring can be applied to detect internal degradation in pumps so that appropriate maintenance can be decided upon based on actual condition rather than arbitrary time scales. The book focuses on the main condition monitoring techniques particularly relevant to pumps (vibration analysis, performance analysis). The philosophy of condition monitoring is briefly summarised and field examples show how condition monitoring is applied to detect internal degradation in pumps. * The first book devoted to condition monitoring and predictive maintenance in pumps. * Explains how to minimise energy costs, limit overhauls and reduce maintenance expenditure. * Includes material not found anywhere else.

**Computer-Managed Maintenance Systems**

**Bottom-line Automation**

Research efforts in the past ten years have led to considerable advances in the concepts and methods of smart manufacturing. Smart Manufacturing: Concepts and Methods puts these advances in perspective, showing how process industries can benefit from these new techniques. The book consolidates results developed by leading academic and industrial groups in the area, providing a systematic, comprehensive coverage of conceptual and methodological advances made to date. Written by leaders in the field from around the world, Smart Manufacturing:
Concepts and Methods is essential reading for graduate students, researchers, process engineers, and managers. It is complemented by a companion book titled Smart Manufacturing: Applications and Case Studies, which covers the applications of smart manufacturing concepts and methods in process industries and beyond. Takes a process-systems engineering approach to design, monitoring, and control of smart manufacturing systems. Brings together the key concepts and methods of smart manufacturing, including the advances made in the past decade. Includes coverage of computation methods for process optimization, control, and safety, as well as advanced modelling techniques.

**Technology and Safety of Marine Systems**

Written by Dr. E.C. Fitch, the book contains over 340 double column pages which include 400 figures and tables, a comprehensive bibliography, and index. There is no root cause of mechanical failure, known to the author, that has been ignored or left out. Nowhere in the world is this information put together in such a concise and comprehensive manner, and the book will serve as a reference and guide to designers, practising engineers, maintenance technicians, plant managers and operators who must design, maintain and operate fluid-dependent mechanical systems.

**The M A N T I S Book**

The exponential increase in the development of technology coupled with the customers’ immense desire to possess the newest technological products makes for truncated product lifespans, which instigates a substantial upsurge in their rate of disposal. Attempts have been made to establish specialized product recovery facilities with the intention of diminishing the volume of accumulated waste delivered to landfills using product recovery procedures such as remanufacturing. The economic benefits produced by remanufacturing also portray the role of product recovery in a more attractive light. The quality of a remanufactured product is uncertain for some consumers. Therefore, these consumers possess insecurities in deciding whether or not the remanufactured products will render the same expected performance. This ambiguity regarding a remanufactured product could possibly result in the consumer deciding against its purchase. With such consumer apprehension, remanufacturers often seek market mechanisms that provide reassurance as to the stable durability that these products still maintain. One strategy that the
remanufacturers often use is the utilization of the premise of offering product warranties with preventive maintenance on their products. This book is concerned with the practice and theory of warranty management and preventive maintenance, particularly in relation to remanufactured products' warranties. Models developed in this book can be used for making the right decisions in offering renewable, nonrenewable, one and two dimensional warranty policies, and for managerial decision in considering maintenance contracts or outsourcing maintenance for remanufactured components and products. Features Discusses a variety of warranty policies and preventive maintenance of remanufactured products (first book to do so) Presents mathematical models and applications for warranty policies using examples and simulation results Considers cost and optimization problems from the remanufacturer's and buyer's points of views Provides a foundation for academicians interested in building models in the area of warranty and preventive maintenance analysis of remanufactured products Offers the essential methodology needed by practitioners involved with warranty and preventive maintenance analysis, along with extensive references for further research

**Machine Learning and Data Science in the Oil and Gas Industry**

As the number of Internet of Things (IoT) elements grows exponentially, their interactions can generate a massive amount of raw and multi-structured data. The challenge with this data explosion is to transform any raw data into information and knowledge, which can be used by people and systems to make intelligent decisions. *Industrial IoT Application Architectures and Use Cases* explores how artificial intelligence (AI), data analytics, and IoT technology combine to promote intelligent decision-making and automation in a range of industries. With faster, more stable AI algorithms and approaches, knowledge discovery and dissemination from IoT-device data can be simplified and streamlined. An era of powerful cognitive technology is beginning due to cloud-based cognitive systems that are forming the foundation of game-changing intelligent applications. This book presents next-generation use cases of IoT and IoT data analytics for a variety of industrial verticals as given below: An Intelligent IoT framework for smart water management An IoT-enabled smart traffic control system for congestion control and smart traffic management An intelligent airport system for airport management and security surveillance An IoT framework for healthcare to integrate and report patient information Fuzzy scheduling with IoT for tracking and monitoring hotel assets An IoT system for designing drainage systems and monitoring drainage pipes Predictive maintenance of plant equipment to decide the actual mean time to malfunction Integrated neural networks and IoT systems for predictive equipment
maintenance IoT integration in blockchain for smart waste management. This book also includes a chapter on the IoT paradigm and an overview of use cases for personal, social, and industrial applications.

**Energy and Analytics**

Stay Up to Date on the Latest Issues in Maintenance Engineering. The most comprehensive resource of its kind, Maintenance Engineering Handbook has long been a staple for engineers, managers, and technicians seeking current advice on everything from tools and techniques to planning and scheduling. This brand-new edition brings you up to date on the most pertinent aspects of identifying and repairing faulty equipment; such dated subjects as sanitation and housekeeping have been removed. Maintenance Engineering Handbook has been advising plant and facility professionals for more than 50 years. Whether you're new to the profession or a practiced veteran, this updated edition is an absolute necessity. New and updated sections include: Belt Drives, provided by the Gates Corporation Repair and Maintenance Cost Estimation Ventilation Fans and Exhaust Systems 10 New Chapters on Maintenance of Mechanical Equipment Inside: • Organization and Management of the Maintenance Function • Maintenance Practices • Engineering and Analysis Tools • Maintenance of Facilities and Equipment • Maintenance of Mechanical Equipment • Maintenance of Electrical Equipment • Instrumentation and Reliability Tools • Lubrication • Maintenance Welding • Chemical Corrosion Control and Cleaning

**Technological Advancement Through Canada-U.S.-Global Interchange**

Volume 1: Explains in drawings and photos the theory of how AC and DC motors work, how the most common motors found in commercial and industrial facilities are constructed, how they are characterized by their nameplate parameters and what points of vulnerability, failure modes and causes are most prevalent. Volume 2: Contains descriptions, explanations of and case studies illustrating 12 diagnostic tests performed during motor manufacturing and repair, including entirely new and extremely valuable test method involving use of polarization index curves called Polarization Index Profile Analysis for determining the condition of insulation systems in all sizes and types of motors in service as well as during restoration short of total rewind. Volume 3: Describes seven technologies for motor electrical predictive condition monitoring, almost all of which have been developed and applied since about 1990. A chapter is devoted to using up to 15 predictive technologies to help refine condition assessments, since no
single technology can detect all failure modes in motors. Volume 4: Aimed at those who are contemplating starting or already engaged in some aspect of motor management. It provides practical, proven ideas on how to design, support and defend programs, how to make them continually improve and how to justify and obtain resources needed to start and expand the effort and gaining full cooperation of all cognizant and/or relevant parties in aspects of motor management.

**Maintenance Engineering Handbook**

In a single useful volume, *Vibration Fundamentals* explains the basic theory, applications, and benefits of vibration analysis, which is the dominant predictive maintenance technique used with maintenance management programs. All mechanical equipment in motion generates a vibration profile, or signature, that reflects its operating condition. This is true regardless of speed or whether the mode of operation is rotation, reciprocation, or linear motion. There are several predictive maintenance techniques used to monitor and analyze critical machines, equipment, and systems in a typical plant. These include vibration analysis, ultrasonics, thermography, tribology, process monitoring, visual inspection, and other nondestructive analysis techniques. Of these techniques, vibration analysis is the dominant predictive maintenance technique used with maintenance management programs, and this book explains the basic theory, applications, and benefits in one easy-to-absorb volume that plant staff will find invaluable. This is the second book in a new series published by Butterworth-Heinemann in association with PLANT ENGINEERING magazine. PLANT ENGINEERING fills a unique information need for the men and women who operate and maintain industrial plants. It bridges the information gap between engineering education and practical application. As technology advances at increasingly faster rates, this information service is becoming more and more important. Since its first issue in 1947, PLANT ENGINEERING has stood as the leading problem-solving information source for America's industrial plant engineers, and this book series will effectively contribute to that resource and reputation. Provides information essential to industrial troubleshooting investigations Describes root-cause failure analysis Incorporates detailed equipment-design guidelines

**Maintenance Planning and Scheduling Handbook**
Data Analytics Applied to the Mining Industry

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.

An Industrial IoT Approach for Pharmaceutical Industry Growth

This manual assists collection system agencies in evaluating the adequacy and effectiveness of their O&M, program and identifying the areas where improvements could be made.

Integrating Practice, Theory, and Design for Engineers

Digital Supply Networks: Transform Your Supply Chain and Gain Competitive Advantage with Disruptive Technology and Reimagined Processes

This newly revised edition helps today's manufacturing companies face the challenges of a global marketplace where every part of the operation must become more efficient to enhance the bottom line. Based on the results and conclusions of an applied research project of process manufacturing operations directed by the author, Bottom-Line Automation presents an overview of more than 30 years of industry trends, pointing out the strengths and pitfalls of
each. The book also explains how manufacturers selected automation technology suppliers for state-of-the-art
technological features in their systems rather than for the improvements the technology could offer the
manufacturing operation. New topics in the book discuss the economic optimization of industrial assets. Key
findings include the fact that returns on automation investments were rarely, if ever, calculated. In fact, accounting
systems were not even capable of measuring the performance offered by process automation systems. The author
explains a strategy for measuring and improving automation system performance for the ultimate goal—the bottom
line, and provides case studies of how such a strategy was implemented in three process manufacturing
organizations. The author brings more than 30 years of industry experience, education, and research together in this
unprecedented work.

Predictive Maintenance of Pumps Using Condition Monitoring

A comprehensive introduction to the most important machine learning approaches used in predictive data analytics,
covering both theoretical concepts and practical applications.

Production and Operations Management

Della Steam Plant Case Study

This text has been developed through extensive research to reflect both the new practices and traditional concepts
that instructors feel are important for students to know. Starr uses real-world themes such as quality, technology,
people and teamwork, globalization, service and manufacturing, environmental awareness and initiatives, and
problem solving. Four real-world cases are included spotlighting Tom’s of Maine, Rosenbluth International, Global
Concepts Inc. at Celestica’s Facility in Little Rock, and the Saturn Corporation on quality, service, smart technology,
and the environment, respectively. This text follows a systems approach that is both systematic and constructive.
Starr integrates OM decisions with the functional areas of business whose challenge is to make the firm perform as a
team. It combines the methods of analysis and synthesis, which lead to better decisions and problem-solving skills
for complex situations. This text has been developed through extensive research to reflect both the new practices
and traditional concepts that instructors feel are important for students to know. Starr uses real-world themes such as quality, technology, people and teamwork, globalization, service and manufacturing, environmental awareness and initiatives, and problem solving. Four real-world cases are included spotlighting Tom's of Maine, Rosenbluth International, Global Concepts Inc. at Celestica's Facility in Little Rock, and the Saturn Corporation on quality, service, smart technology, and the environment, respectively. This text follows a systems approach that is both systematic and constructive. Starr integrates OM decisions with the functional areas of business whose challenge is to make the firm perform as a team. It combines the methods of analysis and synthesis, which lead to better decisions and problem-solving skills for complex situations.

Smart Manufacturing

Learn the art and science of predictive analytics — techniques that get results. Predictive analytics is what translates big data into meaningful, usable business information. Written by a leading expert in the field, this guide examines the science of the underlying algorithms as well as the principles and best practices that govern the art of predictive analytics. It clearly explains the theory behind predictive analytics, teaches the methods, principles, and techniques for conducting predictive analytics projects, and offers tips and tricks that are essential for successful predictive modeling. Hands-on examples and case studies are included. The ability to successfully apply predictive analytics enables businesses to effectively interpret big data; essential for competition today. This guide teaches not only the principles of predictive analytics, but also how to apply them to achieve real, pragmatic solutions. Explains methods, principles, and techniques for conducting predictive analytics projects from start to finish. Illustrates each technique with hands-on examples and includes as series of in-depth case studies that apply predictive analytics to common business scenarios. A companion website provides all the data sets used to generate the examples as well as a free trial version of software.

Maintenance Engineering Handbook

Machine Learning and Data Science in the Oil and Gas Industry explains how machine learning can be specifically tailored to oil and gas use cases. Petroleum engineers will learn when to use machine learning, how it is already used
in oil and gas operations, and how to manage the data stream moving forward. Practical in its approach, the book explains all aspects of a data science or machine learning project, including the managerial parts of it that are so often the cause for failure. Several real-life case studies round out the book with topics such as predictive maintenance, soft sensing, and forecasting. Viewed as a guide book, this manual will lead a practitioner through the journey of a data science project in the oil and gas industry circumventing the pitfalls and articulating the business value. Chart an overview of the techniques and tools of machine learning including all the non-technological aspects necessary to be successful. Gain practical understanding of machine learning used in oil and gas operations through contributed case studies. Learn change management skills that will help gain confidence in pursuing the technology. Understand the workflow of a full-scale project and where machine learning benefits (and where it does not).

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