An Introduction To Predictive Maintenance Plant Engineering
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An Introduction to Predictive Maintenance-R. Keith Mobley 2002-10-24 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 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.

Predictive Maintenance of Pumps Using Condition Monitoring-Raymond S Beebe 2004-04-16 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 degration 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.

Prod & Oper Mgmt,2E-Saxena

Advanced Information Systems Engineering Workshops-Sophie Dupuy-Chessa 2020-05-15 This book constitutes the thoroughly refereed proceedings of the international workshops associated with the 32nd International Conference on Advanced Information Systems Engineering, CAiSE 2020, which was planned to take place in Grenoble, France, during June 8-12, 2020. Due to the Coronavirus pandemic the conference was held virtually. The workshops included in this book are: KET4DF, The Second International Workshop on Key Enabling Technologies for Digital Factories ISESL, The First International Workshop on Information Systems Engineering for Smarter Life The total of 8 full and 3 short papers presented in this volume were carefully reviewed and selected from 20 submissions. The book also contains one invited talk.

Advances in Production Management Systems. Artificial Intelligence for Sustainable and Resilient Production Systems-Alexandre Dolgui

Introduction to Machinery Analysis and Monitoring-John Steward Mitchell 1993 This edition examines a technology that has significantly improved reliability and reduced maintenance costs for a broad range of industrial organizations' machinery analysis. Chapter 15 is for readers who are new to the benefits of on-condition or predictive maintenance. It helps them to gain a perspective prior to focusing on the specifics of the technology and implementation.

Performance Analysis Software System (PASS) and Maintenance Subsystem Integration, Vol. 1- 1993 The Canadian Coast Guard (CCG) has begun the introduction of predictive maintenance techniques to reduce vessel operating costs and improve the reliability of shipboard machinery. The CCG has implemented or is in the process of implementing systems for vibration analysis, lube oil analysis, maintenance management, and inventory management. This report defines the requirements for a performance analysis software system (PASS) and prepares a conceptual design of a predictive upkeep and maintenance program (PUMP) to integrate all maintenance subsystems. Based on the system requirements, a comprehensive market survey was conducted to identify and assess available products suitable for PASS or that could be made so with some modification.

Predictive Maintenance in Dynamic Systems-Edwin Lughofer 2019-02-28 This book provides a complete picture of several decision support tools for predictive
maintenance. These include embedding early anomaly/fault detection, diagnosis and reasoning, remaining useful life prediction (fault prognostics), quality prediction and self-reaction, as well as optimization, control and self-healing techniques. It shows recent applications of these techniques within various types of industrial (production/utilities/equipment/plants/smart devices, etc.) systems addressing several challenges in Industry 4.0 and different tasks dealing with Big Data Streams, Internet of Things, specific infrastructures and tools, high system dynamics and non-stationary environments. Applications discussed include production and manufacturing systems, renewable energy production and management, maritime systems, power plants and turbines, conditioning systems, compressor valves, induction motors, flight simulators, railway infrastructures, mobile robots, cyber security and Internet of Things. The contributors go beyond state of the art by placing a specific focus on dynamic systems, where it is of utmost importance to update system and maintenance models on the fly to maintain their predictive power.

Intelligent and Fuzzy Techniques for Emerging Conditions and Digital Transformation-Cengiz Kahraman

Handbook of Research on Industrial Advancement in Scientific Knowledge-Diaz, Vicente González-Prida 2019-01-18 In a society that praises and promotes technological advancement, it becomes increasingly essential to review the effects of such rapid technological growth. New high-tech advances need to be examined to determine what they mean to science, society, and industry along with the benefits and challenges they present. The Handbook of Research on Industrial Advancement in Scientific Knowledge addresses the intersection of technology and science where engineering considerations, mathematical approaches, and management tools provide a better understanding and awareness of Industry 4.0, while also taking into account the impact on current society. This publication identifies methodologies and applications related to decision making, risk and uncertainty, and design and development not only on scientific and industrial topics but also on social and ethical matters. It is designed for engineers, entrepreneurs, academicians, researchers, managers, and students.

Quality Management ISO 9000 - An Introduction-Ralf Heron 2012-01-01 Quality Management is the key to success, in this economy we are now. Only those Organizations that manage to have and keep satisfied customers will grow back into the market and Survive. History has shown and proven this many times over. The concepts of QM and ISO have been explained in an easy to understand manner by the author in this Book. Quality Management - An Introduction to ISO 9000 - is a revision of Quality Management Your Key to Success from 2010.

Computer-aided Maintenance-Jay Lee 2012-12-06 In today’s business environment, reliability and maintenance drastically affect the three key elements of competitiveness - quality, cost, and product lead time. Well-maintained machines hold tolerances better, help reduce scrap and rework, and raise consistency and quality of the part in addition to cutting total production costs. Today, many factories are still performing maintenance on equipment in a reactive manner due to a lack of understanding about machine performance behaviour. To improve production efficiency, computer-aided maintenance and diagnostic methodology must be applied effectively in manufacturing. This book focuses on the fundamental principles of predictive maintenance and diagnostic engineering. In addition to covering the relevant theory, techniques and methodologies in maintenance engineering, the book also provides numerous case studies and examples illustrating the successful application of the principles and techniques outlined.

Advances in Manufacturing, Production Management and Process Control-Waldemar Karwowski 2018-06-26 This book discusses the latest advances in manufacturing and process control, with a special emphasis on digital manufacturing and intelligent technologies for manufacturing and industrial processes control. The human aspect of the developed technologies and products, their interaction with the users, as well as sustainability issues, are covered in detail. Development of new products using 3D printers, rapid prototyping systems, remote fabrication, and other advanced techniques, is described in detail, highlighting the state-of-the-art and current challenges. Other key topics include digital modeling systems and additive manufacturing, together with their applications in a number of fields, e.g. in bioengineering/biomedicine, in the aerospace, maritime and military fields or for archeological and historical purposes, such as preserving structures, but not limited to this. The book is based on three AHFE 2018 affiliated conferences i.e. the AHFE 2018 International Conference on Advanced Production Management and Process Control, the AHFE 2018 International Conference on Human Aspects of Advanced Manufacturing, and the AHFE 2018 International Conference on Additive Manufacturing, Modeling Systems and 3D Prototyping, which were held on July 21-25, 2018, in Orlando, Florida, USA.

Reliability and Six Sigma-U Dinesh Kumar 2006-06-15 This book is a carefully developed integration of mathematical models that relate Six Sigma and reliability...
measures for the first time. Several case studies are used throughout the book to illustrate the application of the models discussed. The strength of Six Sigma is the way in which it structures the problem and the solution methodology to solve the problem. This is probably the only concept to attract the attention of almost all companies across the world irrespective of their business mission.

Broadband Wireless Communications for Railway Applications—Émilie Masson 2016-10-14 This book focuses on the needs of railway operators in terms of wireless communications, divided in two main categories: the commercial services and the operational needs. Then, all available technologies that can be used to provide Internet access on board trains and all the other operational applications requiring high capacity are detailed. Finally, challenges and trends in railway telecommunications are highlighted, through the presentation of the future and emerging technologies, the current discussions and works in the different authorities, and the key challenges and scientific barriers.

Computational Science and Its Applications – ICCSA 2019–Sanjay Misra 2019-06-28 The six volumes LNCS 11619-11624 constitute the refereed proceedings of the 19th International Conference on Computational Science and Its Applications, ICCSA 2019, held in Saint Petersburg, Russia, in July 2019. The 64 full papers, 10 short papers and 259 workshop papers presented were carefully reviewed and selected from numerous submissions. The 64 full papers are organized in the following five general tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies. The 259 workshop papers were presented at 33 workshops in various areas of computational sciences, ranging from computational science technologies to specific areas of computational sciences, such as software engineering, security, artificial intelligence and blockchain technologies.

Predictive Maintenance, an Answer to OEE Improvement—Richard Wolf 2008 The purpose of this project is to improve overall assembly OEE at Whirlpool Corporation, Clyde Division. With the corporate goal of achieving 97.5% OEE in assembly, our current maintenance methods are not capable of keeping our equipment running at necessary levels. Unplanned equipment downtime is a major roadblock on the path toward this OEE goal. The current problem is that at current production levels, there is no planned downtime for routine maintenance of equipment. With the loss of this time, equipment is no longer being monitored in such a way as to prevent failures. There is no equipment in house to perform adequate maintenance with machinery running. The objective of this study is to introduce a system that will increase our planned downtime to allow for repairs, as well as introduce necessary tools to perform world-class condition monitoring to the facility. With the introduction of key pieces of predictive equipment, the division can realize a reduction in overtime spending, an increased [sic] in planned repairs, and an increase in OEE. The plan is to introduce and conduct a predictive maintenance program. Using this type program, Whirlpool can effectively check and monitor equipment while it is running for failure modes. Finding the conditions that lead to failures ahead of time, allows for planning of repairs and down time to coincide with company needs. Maintenance needs a good system of equipment control that will give an indication of when equipment is due to fail so repairs can be planned and parts ordered before downtime occurs. Predictive maintenance tools and properly trained technicians can be the optimum answer for the prevention of equipment downtime. This system will enable the maintenance department to have good, solid information of impending equipment failure.

Introduction to Machine Vibration—Glenn D. White 2008 The purpose of this book is to serve as a reference text for the maintenance engineer and technician who is working with condition monitoring and predictive machinery maintenance technology. Broadly speaking, the subject is the principles of vibration theory and analysis as they apply to the determination of machine operating characteristics and deficiencies. The first chapter underscores the importance of vibration analysis in the field of predictive maintenance and root cause failure analysis. The chapters on vibration theory and frequency analysis lay the groundwork for the chapter on machine fault diagnostics based on vibration measurement and analysis. A systematic approach is used here to guide the reader through a logical sequence of steps to determine a machine's condition by detailed examination of vibration signatures.

Predictive Maintenance in Smart Factories—Tania Cerquitelli


Extensively updated to cover the latest technologies and methods, Maintenance Engineering Handbook, Eighth Edition offers in-depth details on identifying and repairing faulty equipment. This definitive resource focuses on proven best practices for maintenance, repair, and overhaul (MRO), inventory management, root-cause analysis, and performance management. This thoroughly revised edition contains new chapters on: Reliability-based maintenance

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Sustaining maintenance Ultrasonics Operating dynamics Simplified failure modes and effects analysis Criticality analysis Process and value-stream mapping

Featuring contributions from noted experts in the field, this authoritative reference will help you to successfully reduce excessive downtime and high maintenance costs by detecting and mitigating repetitive failures. Comprehensive coverage of: Organization and management of the maintenance function * Best practices for maintenance and predictive maintenance * Engineering and analysis tools * Maintenance of mechanical, electrical, and facilities equipment
An Introduction to Electric Generators Operation and Maintenance-J. Paul Guyer, P.E., R.A. 2021-08-28 Introductory technical guidance for electrical engineers, mechanical engineers, construction managers and plant managers interested in operation and maintenance of standby and emergency electric power generators. Here is what is discussed: 1. GENERATOR CONFIGURATION 2. DEVELOPING AN O&M PROGRAM 3. OPERATIONS 4. RELIABILITY MAINTENANCE-CENTERED PRACTICES 5. TYPICAL INSPECTION AND MAINTENANCE SCHEDULES.
Infrastructure Planning and Management: An Integrated Approach-Virendra Proag

IoT Streams for Data-Driven Predictive Maintenance and IoT, Edge, and Mobile for Embedded Machine Learning-Joao Gama

IBM Predictive Maintenance and Quality 2.0 Technical Overview-Vrunda Negandhi 2015-06-29 This IBM® RedpaperTM publication updated technical overview provides essential details about the data processing steps, message flows, and analytical models that power IBM Predictive Maintenance and Quality (PMQ) Version 2.0. The new version of PMQ builds on the first one, released in 2013, to help companies efficiently monitor and maintain production assets and improve their overall availability, utilization, and performance. It analyzes various types of data to detect failure patterns and poor quality parts earlier than traditional quality control methods, with the goal of reducing unscheduled asset downtime and improving quality metrics. Version 2.0 includes an improved method of interacting with the solution's analytic data store using an API from the new Analytics Solution Foundation, a reusable, configurable, and extensible component that supports a number of the solution's analytic functions. The new version also changes the calculation of profiles and KPIs, which is now done using orchestrations that are defined in XML. This updated technical overview provides details about these new orchestration definitions.

Mine Planning and Equipment Selection 1996-L.A. Ayres de Silva 1996-01-01 A collection of 125 papers on mine planning and selection of equipment, covering such topics as: design and planning of surface and undergroung mines; planning and equipment selection for difficult mining conditions; equipment selection procedures; and mine and equipment information systems.

Maintenance Engineering Handbook, Eighth Edition-Keith Mobley 2014-01-03 "Updated, modernized, digitized, and streamlined edition of this classic handbook which has been educating plant and facility professionals in every aspect of maintenance engineering for more than half a century"--

From Prognostics and Health Systems Management to Predictive Maintenance 2-Brigitte Chebel-Morello 2017-08-07 This book is the second volume in a set of books dealing with the evolution of technology, IT and organizational approaches and what this means for industrial equipment. The authors address this increasing complexity in two parts, focusing specifically on the field of Prognostics and Health Management (PHM). Having tackled the PHM cycle in the first volume, the purpose of this book is to tackle the other phases of PHM, including the traceability of data, information and knowledge, and the ability to make decisions accordingly. The book concludes with a summary analysis and perspectives regarding this emerging domain, since without traceability, knowledge and decision, any prediction of the health state of a system cannot be exploited.

Practical Machinery Vibration Analysis and Predictive Maintenance-Cornelius Scheffer 2004-07-16 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
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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. Performance Analysis Software System (PASS) and Maintenance Subsystem Integration, Vol. 6-1993. The Canadian Coast Guard (CCG) has begun the introduction of predictive maintenance techniques in an effort to reduce vessel operating costs and improve the reliability of shipboard machinery. The CCG has implemented or is currently developing systems for vibration analysis, lube oil analysis, maintenance management, and inventory management. In support of these measures, developments have begun on defining the requirements for a performance analysis software system and preparing a conceptual design of a predictive upkeep and maintenance program (PUMP) to integrate all maintenance subsystems. This report describes the PUMP conceptual design and its application to existing subsystems and provides a cost estimate.

An Introduction to Renewable Energy Systems-J. Paul Guyer, P.E., R.A. 2017-12-24 Introductory technical guidance for mechanical engineers and other professional engineers and planners interested in renewable energy systems. Here is what is discussed: 1. WIND SYSTEMS 2. PHOTOVOLTAIC SYSTEMS 3. LANDFILL GAS SYSTEMS 4. GEOTHERMAL SYSTEMS 5. BIOMASS SYSTEMS 6. UTILITY INTERCONNECTION.

Productivity and Reliability-Based Maintenance Management-Matthew P. Stephens 2010 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.

An Introduction to Design Criteria for Utility Scale Photovoltaic and Wind Electric Energy Systems-J. Paul Guyer, P.E., R.A. 2020-07-18 Introductory technical guidance for civil, mechanical and electrical engineers and construction managers interested in utility scale solar and wind energy electric power generating facilities. Here is what is discussed: 1. DESIGN CRITERIA - PHOTOVOLTAIC (PV) SYSTEMS 2. DESIGN CRITERIA – WIND SYSTEMS 3. WIND PROJECT DESIGN PLANNING CHECKLIST.

Production at the Leading Edge of Technology-Bernd-Arno Behrens 2021-09-04 This congress proceedings provides recent research on leading-edge manufacturing processes. The aim of this scientific congress is to work out diverse individual solutions of "production at the leading edge of technology" and transferable methodological approaches. In addition, guest speakers with different backgrounds will give the congress participants food for thoughts, interpretations, views and suggestions. The manufacturing industry is currently undergoing a profound structural change, which on the one hand produces innovative solutions through the use of high-performance communication and information technology, and on the other hand is driven by new requirements for goods, especially in the mobility and energy sector. With the social discourse on how we should live and act primarily according to guidelines of sustainability, structural change is gaining increasing dynamic. It is essential to translate politically specified sustainability goals into socially accepted and marketable technical solutions. Production research is meeting this challenge and will make important contributions and provide innovative solutions from different perspectives.

Collaborative Computing: Networking, Applications and Worksharing-Imed Romdhani 2018-09-25 This book constitutes the thoroughly refereed proceedings of the 13th International Conference on Collaborative Computing: Networking, Applications, and Worksharing, CollaborateCom 2017, held in Edinburgh, UK, in December 2017. The 65 papers presented were carefully reviewed and selected from 103 submissions and focus on electronic collaboration between distributed teams of humans, computer applications, and autonomous robots to achieve higher productivity and produce joint products.

Equipment Management in the Post-Maintenance Era-Kern Peng 2018-10-08 Recent advancements in information systems and computer technology have led to developments in equipment and robotic technology that have permanently changed the characteristics of manufacturing equipment. Equipment Management in the Post-Maintenance Era: A New Alternative to Total Productive Maintenance (TPM) introduces a new way of thinking to help high-tech organizations manage an
increasingly complex equipment base. It also facilitates the fundamental understanding of equipment management those in traditional industries will need to prepare for the emerging microchip era in equipment. Kern Peng shares insights gained through decades of managing equipment performance. Using a systems model to analyze equipment management, he introduces alternatives in equipment management that are currently gaining momentum in high-tech industries. The book highlights the fundamental internal flaw in maintenance organizational setup, presents new approaches to replace maintenance functional setup, and illustrates a time-tested transformation and implementation process to help transition your organization from the maintenance era to the new post-maintenance era. Breaks down the history of equipment into five phases Provides a clear understanding of equipment management fundamentals Introduces alternatives in equipment management beyond the mainstream principles of maintenance management The book examines maintenance management logistics, including planning and budgeting, training and people development, customer services and management, vendor management, and inventory management. Supplying a comprehensive look at the history of equipment management, it analyzes current maintenance practice and details approaches that can significantly improve the effectiveness and efficiency of your equipment management well into the future.

Non-Destructive Testing-J. M. Farley 2013-10-22 Non-Destructive Testing, Volume 4 contains the proceedings of the Fourth European Conference held in London on September 13-17, 1987. Contributors explore a variety of topics related to non-destructive testing (NDT), including ultrasonic techniques, ultrasonic systems, electromagnetic techniques, condition monitoring of plant and structures, and magnetic particle and penetrant techniques. This text is comprised of 98 chapters; the first of which describes an ultrasonic technique for the assessment of the fat content of live beef animals for breeding purposes. Attention then turns to measurements of the longitudinal ultrasonic wave attenuation in spheroidal graphite iron test pieces subjected to fatigue loads. The chapters that follow focus on ultrasonic imaging; dry coupling probes; an expert system for ultrasonic examination of fuel rods; engineering and medical applications of diagnostic ultrasound; and signal processing of 3D maps of eddy currents. The reader is also methodically introduced to automation of eddy current testing; the use of artificial intelligence in vibration-based health monitoring; automated inspection of magnetic particles; and the theory and practice of acoustic emission. This text concludes with a chapter that reviews the NDT research program of the National NDT Center of Harwell Laboratory in the UK. This book will be of interest to materials scientists, materials engineers, and metallurgists.

Forsthoffer’s Best Practice Handbook for Rotating Machinery-William E. Forsthoffer 2011-05-21 Optimize plant asset safety and reliability while minimizing operating costs with this invaluable guide to the engineering, operation and maintenance of rotating equipment Based upon his multi-volume Rotating Equipment Handbooks, Forsthoffer’s Best Practice Handbook for Rotating Machinery summarises, expands and updates the content from these previous books in a convenient all-in-one volume. Offering comprehensive technical coverage and insider information on best practices derived from lessons learned in the engineering, operation and maintenance of a wide array of rotating equipment, this new title presents: A unique “Best Practice” and “Lessons Learned” chapter framework, providing bite-sized, troubleshooting instruction on complex operation and maintenance issues across a wide array of industrial rotating machinery. Five chapters of completely new material combined with updated material from earlier volumes, making this the most comprehensive and up-to-date handbook for rotary equipment currently available. Intended for maintenance, engineering, operation and management, Forsthoffer’s Best Practice Handbook for Rotating Machinery is a one-stop resource, packed with a lifetime’s rotating machinery experience, to help you improve efficiency, safety, reliability and cost. A unique “Lessons Learned/Best Practices” component opens and acts as a framework for each chapter. Readers not only become familiar with a wide array of industrial rotating machinery; they learn how to operate and maintain it by adopting the troubleshooting perspective that the book provides Five chapters of completely new material combined with totally updated material from earlier volumes of Forsthoffer’s Handbook make this the most comprehensive and up-to-date handbook for rotary equipment currently Users of Forsthoffer’s multi-volume Rotating Equipment Handbooks now have an updated set, with expanded coverage, all in one convenient, reasonably-priced volume Recent Developments on Industrial Control Systems Resilience-Emil Pricop 2019-10-05 This book provides profound insights into industrial control system resilience, exploring fundamental and advanced topics and including practical examples and scenarios to support the theoretical approaches. It examines issues related to the safe operation of control systems, risk analysis and assessment, use of attack graphs to evaluate the resiliency of control systems, preventive maintenance, and malware detection and analysis. The book also discusses sensor networks and Internet of Things devices. Moreover, it covers timely responses to malicious attacks and hazardous situations, helping readers select the best approaches to handle such unwanted situations. The book is essential reading for
engineers, researchers, and specialists addressing security and safety issues related to the implementation of modern industrial control systems. It is also a valuable resource for students interested in this area.

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