

Two Stage Multiobjective Optimization Of Maintenance

Discussion of the Paper [?] application of Maintenance Optimization Models Discussion of the paper “Application of maintenance optimization models: a review and analysis” written by R. Dekker Joint Optimization of Maintenance and Production Policies Maintenance, Modeling and Optimization Reliability Analysis and Maintenance Optimization of Complex Systems Recent Advances in Reliability and Maintenance Modeling Introduction to Maintenance Engineering Modeling and Optimization of Maintenance Systems Developing Performance Indicators for Managing Maintenance Joint Optimization of Maintenance Policy and Spare Part Inventory Control Using Large Scale Computer Simulation Intelligent Bridge Maintenance and Management Facility-level and System-level Stochastic Optimization of Bridge Maintenance and Replacement Decisions Using History-dependent Models Data Analytics and Artificial Intelligence for Predictive Maintenance in Smart Manufacturing Implementation of Maintenance Management in a Medium Size Industry for Optimization of Maintenance Cost Asset Maintenance Management Integrated Approach to Optimize Operation and Maintenance Costs for Opperrating Nuclear Power Plants Maintenance Excellence Risk-averse Periodic Preventive Maintenance Optimization Guidance for Optimizing Nuclear Power Plant Maintenance Programmes Intelligent Safety and Reliability Analysis of Rail Transit Trains Christophe Gouin Christophe Gouin Nidhal Rezg Mohamed Ben-Daya Qian Qian Zhao Hiroyuki Okamura Mohamed Ben-Daya Xiaoyue Jiang Terry Wireman Prasad Kishor Patil Gang Wu Charles-Antoine Robelin Amit Kumar Tyagi Abhishek Jain Alan Wilson International Atomic Energy Agency John D. Campbell Inderjeet Singh International Atomic Energy Agency Yong Qin Discussion of the Paper [?] application of Maintenance Optimization Models Discussion of the paper “Application of maintenance optimization models: a review and analysis” written by R. Dekker Joint Optimization of Maintenance and Production Policies Maintenance, Modeling and Optimization Reliability Analysis and Maintenance Optimization of Complex Systems Recent Advances in Reliability and Maintenance Modeling Introduction to Maintenance Engineering Modeling and Optimization of Maintenance Systems Developing Performance Indicators for Managing Maintenance Joint Optimization of Maintenance Policy and Spare Part Inventory Control Using Large Scale Computer Simulation Intelligent Bridge Maintenance and Management Facility-level and System-level Stochastic Optimization of Bridge Maintenance and Replacement Decisions Using History-dependent Models Data Analytics and Artificial Intelligence for Predictive Maintenance in Smart Manufacturing Implementation of Maintenance Management in a Medium Size Industry for Optimization of Maintenance Cost Asset Maintenance Management Integrated Approach to Optimize Operation and Maintenance Costs for Opperrating Nuclear Power Plants Maintenance Excellence Risk-averse Periodic Preventive Maintenance Optimization Guidance for Optimizing Nuclear Power Plant Maintenance Programmes Intelligent Safety and Reliability Analysis of Rail Transit Trains Christophe Gouin Christophe Gouin Nidhal Rezg Mohamed Ben-Daya Qian Qian Zhao Hiroyuki Okamura Mohamed Ben-Daya Xiaoyue Jiang Terry Wireman Prasad Kishor Patil Gang Wu Charles-Antoine Robelin Amit Kumar Tyagi Abhishek Jain Alan Wilson International Atomic Energy Agency John D. Campbell Inderjeet Singh International Atomic Energy Agency Yong Qin

scientific essay from the year 2011 in the subject business economics business management corporate governance grade 19 5 20 university of rennes 1 language english abstract maintenance management and optimization of maintenance is getting more and more important for a large number of companies the use of automated machines and equip ment in order to produce goods is very common today hence companies have to rely on reliable machines which are available and working 100 of the time in order to attain a flawless working factory maintenance management is crucial however companies cannot hope that the decisions they make concerning maintenance management are optimal and they start therefore to use decision support systems based on optimization methods also maintenance management is very complex and a lot of different decisions have to be made like defining maintenance intervals personal planning when to buy spare parts when to replace equipment etc it is easier for companies to base their decisions on a mathematical program and therefore the use of maintenance management optimization models arises optimization models proved to be very advantageous in other sectors so it was just a matter of time before optimization methods where ported to maintenance man agement problematic in the case of maintenance optimization are the very specific maintenance problems resulting in a large number of different maintenance optimization models it is consequently very difficult to get a good overview about the different models and their application r dekker who has worked a lot on maintenance optimization and on operations research in maintenance management wrote a paper about maintenance optimization methods and their application application of maintenance optimization models a review and analysis it summarizes maintenance management in general gives a brief history of maintenance management describes different optimization methods their practical a

scientific essay from the year 2011 in the subject business economics business management corporate governance grade 19 5 20 university of rennes 1 language english abstract maintenance management and optimization of maintenance is getting more and more important for a large number of companies the use of automated machines and equip ment in order to produce goods is very common today hence companies have to rely on reliable machines which are available and working 100

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this book presents the recent work regarding the different approaches developed in the framework of the joint optimization of intelligent maintenance and production strategies the originality of these strategies is that they take various constraints into account including production management subcontracting environmental degradation inspection and product quality

production costs are being reduced by automation robotics computer integrated manufacturing cost reduction studies and more these new technologies are expensive to buy repair and maintain hence the demand on maintenance is growing and its costs are escalating this new environment is compelling industrial maintenance organizations to make the transition from fixing broken machines to higher level business units for securing production capacity on the academic front research in the area of maintenance management and engineering is receiving tremendous interest from researchers many papers have appeared in the literature dealing with the modeling and solution of maintenance problems using operations research or and management science ms techniques this area represents an opportunity for making significant contributions by the or and ms communities maintenance modeling and optimization provides in one volume the latest developments in the area of maintenance modeling prominent scholars have contributed chapters covering a wide range of topics we hope that this initial contribution will serve as a useful informative introduction to this field that may permit additional developments and useful directions for more research in this fast growing area the book is divided into six parts and contains seventeen chapters each chapter has been subject to review by at least two experts in the area of maintenance modeling and optimization the first chapter provides an introduction to major maintenance modeling areas illustrated with some basic models part ii contains five chapters dealing with maintenance planning and scheduling part iii deals with preventive maintenance in six chapters part iv focuses on condition based maintenance and contains two chapters part v deals with integrated production and maintenance models and contains two chapters part vi addresses issues related to maintenance and new technologies and also deals with just in time jit and maintenance

this book is a comprehensive guide to methodologies for analyzing reliability and optimizing maintenance in complex systems spanning from initial design to operational stages the book comprises 20 chapters each addressing different research topics in the reliability and maintenance of complex systems these chapters are authored by esteemed professors and researchers in the field of reliability engineering and they are organized as follows system reliability modeling 8 chapters optimal maintenance models 4 chapters system performance and availability analysis 3 chapters and reliability testing and accelerated life tests 2 chapters the remaining chapters focus on reliability testing and life data analysis the book offers an in depth exploration of various techniques algorithms and practical industry applications making it an invaluable resource for researchers engaged in system reliability analysis and maintenance optimization as well as for practical engineers and industrial managers this book will be useful to students researchers and engineers in understanding the latest research issues and techniques in reliability and maintenance engineering

recent advances in reliability and maintenance modeling contains the papers presented at the 11th asia pacific international symposium on advanced reliability and maintenance modeling aparm 2024 nagoya japan 26 30 august 2024 the contributions discuss and explore solutions to the various reliability challenges facing society reliability and maintenance is the technology required in various fields such as but not limited to power systems communication networks transportation cloud computing electronic systems buildings and infrastructure medical and healthcare aviation and railway systems recent advances in reliability and maintenance modeling is of interest to academics and professionals interested or involved in the above mentioned areas

this introductory textbook links theory with practice using real illustrative cases involving products plants and infrastructures and exposes the student to the evolutionary trends in maintenance provides an interdisciplinary approach which links engineering science technology mathematical modelling data collection and analysis economics and management blends theory with practice illustrated through examples relating to products plants and infrastructures focuses on concepts tools and

techniques identifies the special management requirements of various engineered objects products plants and infrastructures

this thesis focuses on modeling and optimization of maintenance systems although the terminology we use is within the domain of manufacturing industry we can identify its potentials in it sections such as software reliability engineering and communication network management to name a few the basic problem we are attacking is how to arrange preventive replacement optimally based on the available information about the system s health condition instead of emphasizing the concrete models which are extremely rich and diverse we focus on the fundamental methodologies to grasp the essence of this subject in chapters 2 to 6 we propose five models which can be roughly classified into two categories age based models chapters 2 3 and 4 and condition based models chapters 5 and 6 while each of the models is of its own practice interest it serves also as the vehicle to convey the methodologies we integrated from the literature or developed in this thesis we solve these models in a fairly unified manner the unified methodology is further summarized in chapter 7 in terms of a common modeling framework and the associated optimization procedure we expect that this framework will be valuable for a wide range of applications

this unique reference utilizes techniques based on other management measurement systems such as the balanced scorecard it also presents a maturing of measurement technique for maintenance and asset maintenance and development techniques allowing companies to be competitive into the future

machine maintenance policy consists of two important activities preventive maintenance to avoid potential breakdowns and the decision once a breakdown has actually occurred either to repair or replace failed machine component present study has focused later case and formulates the joint problem of 1 carrying an optimal number of spare part inventory 2 deciding breakdown maintenance actions to be taken by management a simulation approach is used to formulate a model which can solve joint problem with the objective of minimization of maintenance cost and production loss abstract

this book provides a timely introduction to the methodology of intelligent bridge maintenance and management ibm m and a comprehensive synthesis of emerging digital technologies for realizing ibm m the authors who carry research teaching and consulting experience in the usa japan and china present the background principles methods and application examples of essential ibm m solutions in eight dedicated chapters the digital technologies covered in this book include artificial intelligence big data machine learning computer vision data fusion 3d building information digital twin modeling virtual and augmented reality internet of things sensors robotics including unmanned vehicles the book targets the audience in the broader bridge engineering community including academic researchers students bridge owners and technology providers

today in this smart era data analytics and artificial intelligence ai play an important role in predictive maintenance pdm within the manufacturing industry this innovative approach aims to optimize maintenance strategies by predicting when equipment or machinery is likely to fail so that maintenance can be performed just in time to prevent costly breakdowns this book contains up to date information on predictive maintenance and the latest advancements trends and tools required to reduce costs and save time for manufacturers and industries data analytics and artificial intelligence for predictive maintenance in smart manufacturing provides an extensive and in depth exploration of the intersection of data analytics artificial intelligence and predictive maintenance in the manufacturing industry and covers fundamental concepts advanced techniques case studies and practical applications using a multidisciplinary approach this book recognizes that predictive maintenance in manufacturing requires collaboration among engineers data scientists and business professionals and includes case studies from various manufacturing sectors showcasing successful applications of predictive maintenance the real world examples explain the useful benefits and roi achieved by organizations the emphasis is on scalability making it suitable for both small and large manufacturing operations and readers will learn how to adapt predictive maintenance strategies to different scales and industries this book presents resources and references to keep readers updated on the latest advancements tools and trends ensuring continuous learning serving as a reference guide this book focuses on the latest advancements trends and tools relevant to predictive maintenance and can also serve as an educational resource for students studying manufacturing data science or related fields

maintenance in indian small and medium enterprises smes is regarded as a capital extensive approach rather than profit making approach the position of management is held by the owner himself in most of the indian organizations and management always thinks to optimize the overall expenditure on equipment maintenance in smes in this paper the authors introduce a new concept of total productive maintenance tpm as maintenance management mm for optimizing recurring maintenance costs by using interpretive structural modeling ism approach the effective maintenance strategies in the manufacturing organization can help to save a huge amount of time money and other useful resources generally owners are worried about low production and its product quality but do not try to find the causes behind this problem in smes the authors in this study identify many difficulties and suggest an action plan for the same after finding the causes of these problems the authors observe a drastic change in the targeted organization after adoption of mm

edited by an expert in the maintenance field this wide ranging reference includes in depth contributions from leading professionals consultants university instructors and experts in specific maintenance techniques it provides companies with the methods strategies and practices that will help efficiently and effectively direct and shape their asset management operations

the increasingly competitive environment of the electricity sector has significant implications for nuclear power plant npp operations management objectives must be focused on efficient operation as the key to profitability the business and financial success of operating npps must be given greater consideration through an integrated approach which also ensures the successful achievement of safety and reliability objectives in developing strategic and operational goals nuclear plant managers will be required to embrace and articulate clear and measurable business objectives and goals which not only ensure safety and reliability but also eliminate unnecessary costs and identify investment opportunities this publication looks at the optimization of costs as an integrated part of the management process with a focus on planning strategic and tactical and on controlling control system corrective actions and pay reward functions

considering maintenance from a proactive rather than reactive perspective maintenance excellence details the strategies tools and solutions for maximizing the productivity of physical assets focusing on profitability potential the editors address contemporary concerns key terms data requirements critical methodologies and essential mathematical needs they present maintenance in a business context review planning measurement feedback and techniques related to cost efficiency and results and summarize applications of tools and software from statistics and neural networks to cost optimized models

we consider a class of periodic preventive maintenance pm optimization problems for a single piece of equipment that deteriorates with time or use and can be repaired upon failure through corrective maintenance cm we develop analytical and simulation based optimization models that seek an optimal periodic pm policy which minimizes the sum of the expected total cost of pms and the risk averse cost of cms over a finite planning horizon in the simulation based models we assume that both types of maintenance actions are imperfect whereas our analytical models consider imperfect pms with minimal cms the effectiveness of maintenance actions is modeled using age reduction factors for a repairable unit of equipment its virtual age and not its calendar age determines the associated failure rate therefore two sets of parameters one describing the effectiveness of maintenance actions and the other that defines the underlying failure rate of a piece of equipment are critical to our models under a given maintenance policy the two sets of parameters and a virtual age based age reduction model completely define the failure process of a piece of equipment in practice the true failure rate and exact quality of the maintenance actions cannot be determined and are often estimated from the equipment failure history we use a bayesian approach to parameter estimation under which a random walk based gibbs sampler provides posterior estimates for the parameters of interest our posterior estimates for a few datasets from the literature are consistent with published results furthermore our computational results successfully demonstrate that our gibbs sampler is arguably the obvious choice over a general rejection sampling based parameter estimation method for this class of problems we present a general simulation based periodic pm optimization model which uses the posterior estimates to simulate the number of operational equipment failures under a given periodic pm policy optimal periodic pm policies under the classical maximum likelihood ml and bayesian estimates are obtained for a few datasets limitations of the ml approach are revealed for a dataset from the literature in which the use of ml estimates of the parameters in the maintenance optimization model fails to capture a trivial optimal pm policy finally we introduce a single stage and a two stage formulation of the risk averse periodic pm optimization model with imperfect pms and minimal cms such models apply to a class of complex equipment with many parts operational failures of which are addressed by replacing or repairing a few parts thereby not affecting the failure rate of the equipment under consideration for general values of pm age reduction factors we provide sufficient conditions to establish the convexity of the first and second moments of the number of failures and the risk averse expected total maintenance cost over a finite planning horizon for increasing weibull rates and a general class of increasing and convex failure rates we show that these convexity results are independent of the pm age reduction factors in general the optimal periodic pm policy under the single stage model is no better than the optimal two stage policy but if pms are assumed perfect then we establish that the single stage and the two stage optimization models are equivalent

the objective of the project on optimization of nuclear power plant overall performance within the iaea s subprogramme of nuclear power planning implementation and performance is to systematically improve the overall performance and competitiveness of nuclear power plants npps with due regard to safety through the application of technological and engineering best practices including quality assurance quality management and the utilization of relevant databases as an integrated part of this project the technical working group on life management of npps deals with the managerial and engineering aspects of npp maintenance its optimization process with special regard to the importance of condition monitoring in maintenance strategies and the contribution of maintenance to managing the lifetime of operating npps this publication was developed in the above framework with the objective to collect and analyse proven maintenance optimization methods and techniques engineering and organizational in member states

this book highlights a theoretical framework for architecting the safety and reliability analysis of rail transit trains for active safety assurance rail transit is compared to the main artery of regional economy and the backbone of urban travel the safety and reliability of trains is directly associated with the punctuality and safety of passengers as well as the transport capacity and efficiency of rail transit high intensity operation complex working conditions and external random interference have brought new challenges to the effective analysis of the safety and reliability of rail transit trains the book provides a timely solution to the challenges by providing a theoretical framework that can improve the capacities of systematic real time

predictive reliability analysis and enable it to guide the condition based repair operation and maintenance means the book systematically covers topics including the train operation risk analysis methods health identification and real time reliability analysis of key train components and the polymorphic reliability evaluation and the optimization methods of multi component condition based maintenance decision for train systems it also conducts an in depth discussion on new advances in safety assurance and health management of rail transit trains the book can be used as a theoretical reference for postgraduate students in related majors and as a valuable handbook for engineers and technicians working on rail transit trains

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