

Maintenance Reliability Metrics/KPIs 101

keeping it simple

By Ricky Smith, CMRP and David A. Martin, CMRP

2nd Edition



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Maintenance Reliability Metrics 101 Keeping It Simple

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Maintenance Reliability Metrics **101 Keeping It Simple:**

Maintenance and Reliability Metrics/KPIs 101 Ricky Smith & David A. Martin, 2009-06-17 Time and attention are currently two of the world's scarcest resources and that of course applies particularly to Maintenance and Reliability professionals. This work by Ricky Smith and David A. Martin is written in a format that allows you to quickly read and absorb the lessons in a couple of hours. After the initial read it automatically converts into a KPI reference manual you can use time and again as you work to improve performance. The authors move quickly and efficiently to define a series of metrics and more importantly instruct you in where and when to use them. They are both committed to helping you become a Reliability Performance Manager as you use this information to drive bottom line improvements at your organization. This book should certainly be read by everyone in your Maintenance department but our hope is that you would also acquire copies for all of your Operations Supervisors and Managers as well. You might even consider giving a copy to your Plant Manager.

Maintenance Reliability Metrics/KPI 101 - 2nd Edition Smith, 2012-04-18 Maintenance and Reliability Lubrication 101 Ricky Smith; David A. Martin, 2009-12-15 Lubrication accounts for a significant proportion of equipment failures. Improper lubrication practices are at the heart of many equipment reliability issues. Studies have shown that 70-85% of equipment failures are self-induced, meaning that maintenance practices and processes are directly responsible for the failures. As such, it's obvious that proper lubrication is vital to the success of reliability and in turn operational assurance and cost control. First and foremost, Discipline is the key to the success of any proactive maintenance program. This book will identify effective ways to bridge the gap between established and proven Best Practices and your current program. Combining the right lubrication activities with proper practices, a significant opportunity exists to use the lubrication function within maintenance to impact plant reliability. Buy a copy for every manager, supervisor, planner, and scheduler. **Rules of Thumb for Maintenance and Reliability Engineers** Ricky Smith, R. Keith Mobley, 2011-03-31 Rules of Thumb for Maintenance and Reliability Engineers will give the engineer the have-to-have information. It will help instill knowledge on a daily basis to do his or her job and to maintain and assure reliable equipment to help reduce costs. This book will be an easy reference for engineers and managers needing immediate solutions to everyday problems. Most civil, mechanical, and electrical engineers will face issues relating to maintenance and reliability at some point in their jobs. This will become their go-to book. Not an oversized handbook or a theoretical treatise but a handy collection of graphs, charts, calculations, tables, curves, and explanations. Basic rules of thumb that any engineer working with equipment will need for basic maintenance and reliability of that equipment. Access to quick information which will help in day-to-day and long-term engineering solutions in reliability and maintenance. Listing of short articles to help assist engineers in resolving problems they face. Written by two of the top experts in the country. *Maintenance - Roadmap to Reliability* Rolly Angeles, 2016-04-29 This book depicts the life and struggle of maintenance in seeking better ways and means to improve the reliability of the equipment and assets. The

author shares his experience on how to achieve such feat Transitioning from a reactive to a proactive maintenance stage is not an easy tasks but it is not also an impossible tasks What the author believes is that the key to everything is educating the maintenance people on what maintenance is all about Training is where we acquire knowledge to develop the skills required to do our job right This book contains real life stories struggles and actual experiences by the author in his career in maintenance and currently as a Reliability and Maintenance Consultant Every industry must change their paradigm and realize that maintenance are not repair people The meaning of the word maintain is simply to preserve our equipment and assets And we can only preserve our assets if maintenance are equipped with the right knowledge on how to perform their jobs right the first time around I have written this book in order to reach out to industries in search of discovering ways to improve not only their equipment and assets but as well as their maintenance human resources Remember that maintenance is not a department it is not a function or any organization but rather maintenance are humble and down to earth human being hence let us provide them with the respect that they truly deserve because that is all they ask for The message of this book is simple and straightforward There is no better way to start the journey to reliability other than to go back to the basics and addressing these very small problems we have in our plant Big problems unplanned breakdowns and catastrophic failures are just an accumulation of small problems that has always been ignored in the first place Maintenance is always a shared responsibility for operators and maintenance working together in complete harmony It will be difficult for maintenance to transition from a reactive to a proactive mode if operators will not be involved in doing maintenance since maintenance is always a shared responsibility for operators and maintenance This book explains in detail on how to proceed with the 4 Phases of Planned Maintenance and how to integrate RCM into the TPM process It also covers the importance of doing Autonomous Maintenance as well as Spare Parts Management which is believed to be the missing link theory on any reliability and maintenance strategy Chapter 11 is a classic case study on what maintenance can achieve if there is a clear roadmap to follow The last chapter states that maintenance are just human like you and me What is important is not to blame them for every single failure that occur in the plant but for both operations and maintenance to work together on the problem Many industries are looking for a structured and detailed approach on how they can improve their maintenance asset and resources This book provide that level of information Each chapter begins with a quote on wisdom of maintenance and at the end of each chapter will be a quiz for you to answer

Handbook of Maintenance Management and Engineering Mohamed Ben-Daya, Salih O. Duffuaa, Abdul Raouf, Jezdimir Knezevic, Daoud Ait-Kadi, 2009-07-30 To be able to compete successfully both at national and international levels production systems and equipment must perform at levels not even thinkable a decade ago Requirements for increased product quality reduced throughput time and enhanced operating effectiveness within a rapidly changing customer demand environment continue to demand a high maintenance performance In some cases maintenance is required to increase operational effectiveness and revenues and customer satisfaction while

reducing capital operating and support costs This may be the largest challenge facing production enterprises these days For this maintenance strategy is required to be aligned with the production logistics and also to keep updated with the current best practices Maintenance has become a multidisciplinary activity and one may come across situations in which maintenance is the responsibility of people whose training is not engineering This handbook aims to assist at different levels of understanding whether the manager is an engineer a production manager an experienced maintenance practitioner or a beginner Topics selected to be included in this handbook cover a wide range of issues in the area of maintenance management and engineering to cater for all those interested in maintenance whether practitioners or researchers This handbook is divided into 6 parts and contains 26 chapters covering a wide range of topics related to maintenance management and engineering **Engineering Maintainability:** B.S. Dhillon Ph.D.,1999-06-16 This book provides the guidelines and fundamental methods of estimation and calculation needed by maintainability engineers It also covers the management of maintainability efforts including issues of organizational structure cost and planning processes Questions and problems conclude each chapter Maintenance and Reliability Best Practices Ramesh Gulati,Ricky Smith,2009

Preventive Maintenance Made Simple Ricky Smith,Doug Stangier,2016-07-21 **Reliability-Centered Maintenance: Management and Engineering Methods** R.T. Anderson,L. Neri,2012-12-06 In this book the authors provide a fresh look at basic reliability and maintainability engineering techniques and management tools for application to the system maintenance planning and implementation process The essential life cycle reliability centered maintenance ReM activities are focused on maintenance planning and the prevention of failure The premise is that more efficient and therefore effective life cycle maintenance programs can be established using a well disciplined decision logic analysis process that addresses individual part failure modes their consequences and the actual preventive maintenance tasks This premise and the techniques and tools described emphasize preventive not corrective maintenance The authors also describe the techniques and tools fundamental to maintenance engineering They provide an understanding of the inter relationships of the elements of a complete ReM program which are applicable to any complex system or component and are not limited only to the aircraft industry They describe special methodologies for improving the maintenance process These include an on condition maintenance OEM methodology to identify defects and potential deterioration which can determine what is needed as a maintenance action in order to prevent failure during use **World Class Maintenance Management** Rolly Angeles,2018-03-18 About this WCM Book My intent in writing this book is not only to provide a strategic framework on what it takes for an industry to achieve a World Class Maintenance Management structure but to let each one of us understand the role of maintenance in our industry The role of the maintenance function is not about eliminating failures but understanding that each failure has its own unique and distinctive consequences Maintenance is not about repairing and scheduling equipment for repair It is much more than that and that each of us who belongs to the maintenance function should stand

proud because maintenance plays a major role in the success or failure of any industry Achieving an excellent maintenance structure is not only about having the best Predictive Maintenance instruments and computer software in town but it has more to do with the people their culture and how each maintenance thinks This book is divided into three parts Part 1 covers about the basic discipline that has often been neglected in our equipment Part 2 refers to the intermediate discipline which refers to the different strategies which must be adapted on maintenance to improve our equipment reliability and Part 3 covers about the more advanced disciplines Part 1 Basic Discipline Back to Basics Discipline 1 Training and Education Discipline 2 Set up Maintenance Indices and KPI s Discipline 3 Autonomous Maintenance Discipline 4 Addressing Basic Equipment Condition Discipline 5 Preventive Maintenance Part 2 Intermediate Discipline Maintenance Strategies Discipline 6 Spare Parts Management Discipline 7 Life Cycle Management Discipline 8 Lubrication Strategy Discipline 9 Root Cause Failure Analysis Discipline 10 Reliability Initiatives TPM and RCM Part 3 Advance Discipline Specialized Strategies Discipline 11 Predictive Maintenance Discipline 12 Computerized Maintenance Management Software CMMS It is not easy to change a maintenance system that had been in place in the industry for many years but it is possible for every company to transform from a firefighting to a world class maintenance structure and this is the objective of writing this book I have detailed every step so you can follow them thoroughly Let us face the facts about your system of maintenance so we can learn from them Many companies are struggling to survive together with their competition Maintenance is one big factor where a company can save on cost if one has the right tools and knowledge to convert their maintenance task into an excellent maintenance structure Reliability cannot be achieved by cutting costs but rather improving reliability will definitely reduce our maintenance and operating costs There is no such thing as plant overnight success or one day transformation It will take several years to achieve a state of world class maintenance structure Being world class is a long term and not a short term approach It is a long journey yet the time spent will be very rewarding Achieving a world class maintenance structure is not about being the best but giving it our best and doing it better Having a world class maintenance structure is not about improving our equipment but improving the people maintaining our equipment The focus will always be on the people You need three things to make this happen a plan a team and a big heart This book is about the first part which is having a plan I leave the other two elements with you which are a team and a big heart When your people unite into a common goal only then can you realize that your maintenance people can move mountains Millions of dollars can be saved on maintenance by adopting a change in your maintenance system This is a book for every industry that dares to improve their maintenance human resources

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

Maintainability, Maintenance, and Reliability for Engineers B.S. Dhillon, 2006-03-27 The demands of the global economy require manufacturers to produce highly reliable and easily maintainable engineering products Recent studies indicate that for many large and sophisticated products or systems maintenance and support account for as much as 60 to 75 percent of their life cycle costs Therefore the role of maintainability maintenance and reliability has become increasingly significant Satisfying the pressing need for a volume that addresses these subjects with an interdisciplinary approach Maintainability Maintenance and Reliability for Engineers distills knowledge specific to each discipline into one comprehensive resource After reviewing the history of all three fields and their interrelationships the book covers mathematical concepts such as Boolean algebra laws probability properties mathematical definitions and probability distributions It includes reliability evaluation methods such as fault tree analysis network reduction method delta method Markov method supplementary variables method and reliability management both mechanical and human Highlighting maintainability tools and functions the author discusses topics in maintainability management and costing including tasks during product life cycle program plan organization functions design reviews life cycle costing investment cost elements and life cycle cost estimation models The author also includes coverage of maintenance engineering focusing on safety quality corrective and preventive maintenance The book concludes with coverage of maintenance management costing and human error in engineering maintenance and contains 60 illustrations 16 tables and more than 200 equations There is a definite need to consider maintainability maintenance and reliability during product system design and other phases To achieve this goal effectively it is absolutely imperative to have a certain degree of understanding of each of these disciplines *Oil and Gas Maintenance Metrics* Ricky Smith, Allied Reliability Group, 2013-10-27 Develop a best in class maintenance organization by selecting the right performance metrics Edited by an author with over 30 years of experience in oil and gas maintenance Oil and Gas Performance Maintenance Metrics provides the tools and methods to develop revolutionary proactive maintenance metrics that are guaranteed to save time and money and improve reliability Oil and Gas Performance Maintenance Metrics provides maintenance managers with the metrics calculations and indicators for measuring maintenance reliability and availability performance With this book in hand maintenance supervisor learn to calculate a number of key performance indicators KPIs such as maintenance cost maintenance man hours and availability performance that drive performance Brief and readable the book's seven part treatment starts with a clear and rigorous exposition of the terminology and definitions in maintenance

followed by self contained chapter on the indicators and how to improve the performance measured by the indicators metrics The book is accompanied by downloadable apps for calculating a number of key performance indicators Downloadable apps for Calculating key performance indicators Tips and methods to disseminate knowledge and share best practices Methods for improving performance based on the indicators metrics *Maintenance Leadership 101 - Tips and Tools* Lee McClish,2021-05-28 New to maintenance supervision or management Wondering where to start or what road map to follow Maybe you are a maintenance veteran This book provides direction in most areas of maintenance and reliability for an industrial manufacturing facility for the young or old The concepts presented can be extended to any industry that uses equipment and maintain their building and grounds Prepare to read twenty five years of experience summed up for a concise set of tools and many tips as a jump start toward maintenance excellence Thirty plus proven tools are provided to aid your journey that are easily adaptable to any maintenance organization Sometimes the human capital element gets lost in the day to day fighting fires The proven leadership tips presented will produce results if adapted Just raising the level of attention of the workers will produce results and solidify the team that accomplishes the maintenance on the shop floor or out in the field Expect to realize improvements in your process *Reliability-Centered Maintenance* R. T. Anderson,L. Neri,1990-12-31

Reliability Centered Maintenance (RCM) Neil B. Bloom,2005-12-22 A properly implemented and managed RCM program can save millions in unscheduled maintenance and breakdowns However many have found the process daunting Written by an expert with over 30 years of experience this book introduces innovative approaches to simplify the RCM process such as single vs multiple failure analysis hidden failures analysis potentially critical components analysis run to failure and the difference between redundant standby and backup functions Included are real life examples of flawed preventive maintenance programs and how they led to disasters that could have easily been avoided Also illustrated in detail with real life examples is the step by step process for developing implementing and maintaining a premier classical RCM program Senior management middle management supervisors and craftsmen technicians responsible for plant safety and reliability will find this book to be invaluable as a means for establishing a first class preventive maintenance program

Cutting-Edge Maintenance Management Strategies Rolly Angeles,2020-04-26 During the start of this year 2020 I have been thinking a lot about the need to right my fourth book on maintenance What title should I give this book and why What industries need today are Cutting Edge Maintenance Management Strategies that can be explained in a straightforward and simple manner for industries that they can easily adopt Today what every industry need is a way on how to survive their competition and remain in business I started drafting this book on March 16 2020 We all know about this pandemic on covid 19 which have struck the whole world and affected so many businesses and industries in all countries globally Many industries have been halted by this pandemic and many jobs were lost as a result Honestly speaking I am not certain when this pandemic will end since as of this writing the number of cases is increasing exponentially and vaccine is

still unavailable It is my hope that once everything goes back to normal leaders in industries can learn from experience to manage the risks involved and sustain their assets more intelligently When I first published my first book on World Class Maintenance Management the 12 Disciplines in 2009 I thought I have written everything there is to know in order to achieve a level of World Class Maintenance Management Through the years what I learned so far is that having a World Class Maintenance is very different from achieving a World Class Reliability in the organization There are also many developments and changes today in maintenance that we need to adopt The reason for writing this book is not only for the readers to understand the new trends in maintenance but also for them to understand the reason for using them These strategies must be adopted by industries for their own advantage because in today s phase the law of the jungle applies and that is survive now or be left behind Cutting Edge Maintenance Management Strategies This book also a sequel deals with the different cutting edge maintenance strategies that must be adopted by industries in order for them to survive their competition In industries today the law of the jungle applies survive or be left behind Learn how these strategies can link together in building a solid maintenance structure in the plant Finally understand Learn these cutting edge maintenance strategies in helping build the reliability culture for industries Engineering Maintainability How To Design For Reliability And Easy Maintenance Dhillon, MAINTENANCE ENGINEERING AND MANAGEMENT V. VENKATARAMAN, 2007-07-25 This text is an accessible and comprehensive guide to the principles practices functions and challenges of maintenance engineering and management With a strong emphasis on basic concepts and practical techniques throughout the book demonstrates in detail how effective technical competencies in maintenance management can be built in engineering organizations The book thus provides students and practising engineers alike with the methodologies and tools needed to understand and implement the systems approach to maintenance management The major goals for the text include To provide a good understanding of different types of maintenance management systems such as breakdown preventive predictive proactive To explain benefits of planned maintenance To explain condition based monitoring techniques with focus on vibration monitoring thermography and motor condition monitoring To stress the role of reliability engineering in maintenance with tools like Failure Mode and Effect Analysis Root Cause Analysis and Criticality Matrix To explain activities of maintenance planning with focus on shutdown planning human resources development and tools employed for monitoring To emphasize management functions such as procurement of spares measurement of maintenance effectiveness etc To give an overview of project management tools such as PERT etc To introduce computerized maintenance management systems To explain the basics of hazard analysis and fault tree analysis Review questions in each chapter worked out examples wherever applicable case studies and an exclusive appendix on Selected Questions and Answers are all designed to provoke critical thinking This text is suitable for undergraduate and postgraduate courses in Maintenance Engineering taught in the department of mechanical engineering in almost all universities

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Table of Contents Maintenance Reliability Metricskpis 101 Keeping It Simple

1. Understanding the eBook Maintenance Reliability Metricskpis 101 Keeping It Simple
 - The Rise of Digital Reading Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Advantages of eBooks Over Traditional Books
2. Identifying Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Maintenance Reliability Metricskpis 101 Keeping It Simple
 - User-Friendly Interface
4. Exploring eBook Recommendations from Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Personalized Recommendations
 - Maintenance Reliability Metricskpis 101 Keeping It Simple User Reviews and Ratings
 - Maintenance Reliability Metricskpis 101 Keeping It Simple and Bestseller Lists

5. Accessing Maintenance Reliability Metricskpis 101 Keeping It Simple Free and Paid eBooks
 - Maintenance Reliability Metricskpis 101 Keeping It Simple Public Domain eBooks
 - Maintenance Reliability Metricskpis 101 Keeping It Simple eBook Subscription Services
 - Maintenance Reliability Metricskpis 101 Keeping It Simple Budget-Friendly Options
6. Navigating Maintenance Reliability Metricskpis 101 Keeping It Simple eBook Formats
 - ePub, PDF, MOBI, and More
 - Maintenance Reliability Metricskpis 101 Keeping It Simple Compatibility with Devices
 - Maintenance Reliability Metricskpis 101 Keeping It Simple Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Highlighting and Note-Taking Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Interactive Elements Maintenance Reliability Metricskpis 101 Keeping It Simple
8. Staying Engaged with Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Maintenance Reliability Metricskpis 101 Keeping It Simple
9. Balancing eBooks and Physical Books Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Maintenance Reliability Metricskpis 101 Keeping It Simple
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Setting Reading Goals Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Fact-Checking eBook Content of Maintenance Reliability Metricskpis 101 Keeping It Simple
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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