

Preface

Overview

The aim of this book is to continue with the development of a framework for maintenance and assets management that has been promoted by the SIM group over the years (the reader can find the seminal work regarding the referred management framework in Springer: Crespo Márquez 2007). To that end, this manuscript describes new advanced models, methods and techniques, which can be applied at different stages of the originally proposed management process, as well as their practical implementation. During the last 15 years, among other research activities, the SIM group has:

- Published 13 books (4 with Springer-Verlag and 2 with IGI Global, 2 in Chinese with Machinery Industry Press and National Defense Industry Press, 1 in Farsi with the University of Tehran, and 4 in Spanish with AENOR [2], INGEMAN and ETSI Sevilla), and coordinate other 3 books more (two from an international conference and other from the national research network on assets management)
- Authored 75 chapters in scientific books and 104 research articles of which 75 are articles in international journals and 45 are published in the JCR.
- Made more than 80 contributions in congresses of which 65 are international.
- Directed 11 Ph.D. works and over 150 Master Thesis.
- Opened international connections with many universities around the world.
- Evaluated research projects for national and international research agencies (Swedish, Canadian and Italian, among others).
- Developed research lines related to:
 - Asset Management
 - Maintenance Engineering and Management
 - Supply Chain Management and Logistics
 - Simulation and Analysis tools.

In the SIM group we realize that asset management, once considered a tactical area, is now a matter of strategy, given the implications it has for the proper

development of the business policy. In addition, the introduction of advanced manufacturing techniques and new production management systems, which lead to increased automation and reduced delivery times, has given great importance to asset management. In manufacturing, production, finance, etc., decisions are increasingly taken based on models or techniques which provide satisfactory, objective decision making, which guarantees improved competitiveness, reducing risk and uncertainty, and that can be justified to management. However, maintenance managers have taken decisions based only on their experience or supported by the advice of system sales staff or consultants. This lack of models and techniques in the area of asset management leads to underperforming maintenance departments characterized by a reactive approach, underutilized maintenance information systems, inaccurately managed costs, no scheduled maintenance hours, feedback on work quality not being provided, etc. Hence, this book looks to promote and address the application of objective and effective decision-making in asset management based on mathematical models and practical techniques that can be easily implemented in organizations.

Summary of Topics and Target Audience

The relevance of maintenance in organizations has increased considerably over the last two decades; this importance is linked to the introduction of a growing number of factors with an influence on the effective and efficient asset management. The existence of increasingly complex equipment and processes, the increase in the number of assets, the speed of technological change, the need to reduce costs in the modern world, together with increases in the level of excellence of commercial goals such as quality and delivery time, and concern for the safety of workers and the environment, make asset management an important source of benefits and competitive advantages for present and future world class enterprises. This book analyses these factors, which are divided into, although not limited to, the following categories:

- Maintenance policy selection.
- After-sales management.
- Knowledge management.
- Critical asset and infrastructure management.
- Asset life cycle management.
- Performance measurement system.
- Sensors and health monitoring systems.
- Reliability centred maintenance.
- Building information modelling.
- Advanced maintenance techniques.
- Set-up processes analysis.

Industrial and manufacturing engineers, managers and plant supervisor, academicians, researchers, advanced-level students (both postgraduate and doctoral),

technology developers and managers who take decisions in this field will find in this book a source of ideas, models and techniques which mark out a path for future research in this field and may also serve to encourage original ideas and in many cases practical application in business. This book is aimed at the above-mentioned target audience worldwide and because of the number of chapters it contains and the variety of the subjects analysed, it provides an in-depth look at current global concerns.

Background Material and Origin of Each Chapter

The content of the book is divided into seven parts. Briefly, each part deals with the following matters:

- The first part is an introduction to the topic and to the manuscript.
- The second part presents new possible evolutions in the current assets management framework, according to new standards, techniques and technologies.
- The third part contains advanced tools to improve effectiveness of management, especially under modern dynamic scenario considerations.
- The fourth part includes methods for the improvement of management efficiency, which benefit of a more affordable online information availability regarding assets' conditions.
- The fifth part present innovative techniques to easy management control, providing also a more practical approach to maintenance activities accountability.
- The sixth part compiles new efforts in continuous improvements using artificial intelligence tools mixed with advanced interoperability of the information systems. At the same time explore advance analysis of different operational possibilities to improve assets management.
- Finally, the seventh part is devoted to summarize conclusions and to infer future developments.

Different research results of the SIM group, over the last 5 years, are serving as the main basis and background for the mentioned parts.

Table 1 explicitly mentions the publication linked to each book chapter.

At the same time, each chapter has been developed by a group of authors (some belonging properly to the SIM Research Group, and other assiduous collaborators with the group), whose relevance in the field of asset management has been manifested for years. A brief biographical note of each one of them is shown in the section List of Contributors. Additional information about the contributions in the book can be found in the Intelligent Maintenance Systems Group (SIM) web site (University of Seville) at <http://taylor.us.es/sim>.

Table 1 Link between chapters and published references

Chapter	Title	Original reference
1	On the Family of Standards UNE-ISO 55000 and How to Effectively Manage Assets	Sola Rosique et al. (2015)
2	A Maintenance Management Framework Based on PAS 55	López-Campos and Crespo Márquez (2011)
3	The Integration of Open Reliability, Maintenance and Condition Monitoring Management Systems	López-Campos et al. (2013)
4	Prognostics and Health Management in Advanced Maintenance Systems	Guillén et al. (2016a)
5	A Framework for Effective Management of CBM Programs	Guillén et al. (2016b)
6	Criticality Analysis for Maintenance Purposes	Crespo Márquez et al. (2015)
7	AHP Method According to a Changing Environment	González-Prida et al. (2014)
8	Reliability Stochastic Modelling for Repairable Physical Assets	Viveros et al. (2016)
9	Economic Impact of a Failure Using Life-Cycle Cost Analysis	Parra et al. (2012)
10	Online Reliability and Risk to Schedule the Preventive Maintenance in Network Utilities	Crespo et al. (2013)
11	Customer-oriented Risk Assessment in Network Utilities	Gómez et al. (2016a)
12	Dynamic Reliability Prediction of Asset Failure Modes	Gómez et al. (2016b)
13	A Quantitative Graphical Analysis to Support Maintenance	Barberá et al. (2012)
14	Case Study of Graphical Analysis for Maintenance Management	Barberá et al. (2013)
15	A Graphical Method to Support Operation Performance Assessment	Viveros et al. (2015)
16	Value-Driven Engineering of e-maintenance Platforms	Macchi et al. (2014)
17	Assistance to Dynamic Maintenance Tasks by Ann-Based Models	Olivencia et al. (2015)
18	Expected Impact Quantification Based on Reliability Assessment	Kristjampoller et al. (2016)
19	Influence of the Input Load on the Reliability of the Grinding Line	Barberá et al. (2014)

The a.m. references are detailed in Chapter “[On the Family of Standards UNE-ISO 55000 and How to Effectively Manage Assets](#)”

Conclusions

As introduced at the beginning of this preface, this book looks to promote and address the application of objective and effective decision-making in asset management based on mathematical models and practical techniques that can be easily implemented in organizations. This comprehensive and timely publication aims to be an essential reference source, building on the available literature in the field of asset management while providing for further research breakthroughs in this field. This text provides the necessary resources for managers, technology developers, scientists and engineers to adopt and implement optimum decision-making based on models and techniques that contribute to recognizing risks and uncertainties and, in general terms, to the important role of asset management to increase competitiveness in organizations.

Seville, Spain

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Reference

Crespo Márquez A (2007) The maintenance management framework. Models and methods for complex systems maintenance. Springer Series in Reliability Engineering. ISBN: 978-1-84628-820-3

Advanced Maintenance Modelling for Asset
Management
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Systems

Crespo, A.; González-Prida Díaz, V.; Gómez Fernández,
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