

# **2nd IFAC Workshop on Advanced Maintenance Engineering, Services and Technology 2012**

**Seville, Spain  
22-23 November 2012**

**ISBN: 978-1-62276-925-4**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2012) by Elsevier Limited  
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact the publisher, Elsevier Limited  
at the address below.

Elsevier Limited  
The Boulevard, Langford Lane  
Kidlington OX5 1GB, United Kingdom

Phone: +44 (0)1865 844640  
Fax: +44 (0)1865 843912

Email: [eurobkinfo@elsevier.com](mailto:eurobkinfo@elsevier.com)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>Asset Optimization and Predictive Maintenance in Discrete Manufacturing Industry</b> .....	1
<i>F. Demmoly, D. Kiritsis</i>	
<b>The Role of Maintenance Regarding Improving Product Quality and Company's Profitability: A Case Study</b> .....	7
<i>Damjan Maletic, Matjaz Maletic, Basim Al-Najjar, Bostjan Gomiscek</i>	
<b>Functional Stockpile Analysis in Complex Productive Systems</b> .....	13
<i>Pablo Viveros, Rene Tapia, Fredy Kristjanpoller, Luis Barbera, Vicente Gonzalez-Prida</i>	
<b>On the Classification of Spare Parts with a Multi-Criteria Perspective</b> .....	19
<i>Irene Roda, Marco Macchi, Luca Fumagalli, Pablo Viveros</i>	
<b>Dynamic Analytic Hierarchy Process: AHP Method Adapted to a Changing Environment</b> .....	25
<i>V. Gonzalez-Prida, L. Barbera, P. Viveros, A. Crespo</i>	
<b>Supervisory System for Supporting Decision-Making Process in Proactive Maintenance of Technical Object</b> .....	30
<i>J. Smoczek, J. Szytko</i>	
<b>Condition Monitoring Architecture for Maintenance of Dynamical Systems with Unknown Failure Modes</b> .....	36
<i>A. Chammas, M. Traore, E. Duviella, M. Sayed-Mouchaweh, S. Lecoeuche</i>	
<b>A Distributed Diagnosis Strategy using Bayesian Network for Complex Wiring Networks</b> .....	42
<i>Wafa Ben Hassen, Fabrice Auzanneau, Francois Peres, Ayeley Tchangani</i>	
<b>Training in RAMS in Collaboration with Industrial Companies and Institutions</b> .....	48
<i>J. Marcos, M. J. Fernandez, J. Sanchez, M. Suarez, A. M. Mariblanca</i>	
<b>Application of Artificial Intelligence in Maintenance Modelling and Management</b> .....	54
<i>Khairy A. H. Kobbacy</i>	
<b>Dynamic Bayesian Network Approach to Improve the Preventive Maintenance of Multi-State Systems</b> .....	60
<i>F. Danioko, S. Addouche, A. El Mhamedi</i>	
<b>Remaining Useful Life (RUL) Based Maintenance Decision Making for Deteriorating Systems</b> .....	66
<i>Phuc Do Van, Eric Levrat, Alexandre Voisin, Benoit Jung</i>	
<b>Condition Based Maintenance for Complex Engineering Assets: A Multi-Layered Modelling Approach</b> .....	73
<i>Ajith Kumar Parlikad, Zhenglin Liang</i>	
<b>Dynamic Grouping Maintenance for Complex Structure Systems with Non-Negligible Replacement Time</b> .....	79
<i>Hai Canh Vu, Phuc Do Van, Anne Barros</i>	
<b>Fiber Optic Sensors for Diagnosis and Maintenance in Lead-Acid Batteries</b> .....	85
<i>J. Marcos, A. M. Cao-Paz, A. Lago, A. Nogueiras, C. M. Panalver</i>	
<b>A Robust Fault Detection Algorithm Using q-LPV Interval Observer Together with an Accommodation System Based on Actuators Reconfiguration</b> .....	91
<i>H. Bolandi, M. Abedi, M. Haghparast</i>	
<b>Unsupervised Trend Extraction for Prognostics and Condition Assessment</b> .....	97
<i>Ahmed Mosallam, Kamal Medjaher</i>	
<b>State Model Degree Reduction of a Multistate Complex System Structured by a Coloured Petri Nets (CPN)</b> .....	103
<i>Zhouhang Wang, Maen Atli, Kondo H. Adjalliah</i>	
<b>Preventive Maintenance Policy for Multi-Component Systems Subject to Random Environmental Damage Generation</b> .....	109
<i>M. Radhoui, L. Tlili, A. Chelbi, N. Rezg</i>	
<b>A Dynamic Prognostic Maintenance Policy for Multi-Component Systems</b> .....	115
<i>Adriaan Van Horenbeek, Liliane Pintelon</i>	
<b>Methodological Proposal for Problem Resolution in Industrial Activities Based on Failure Mode Analysis. Case Applied in the Cellulose Industry, Chile</b> .....	121
<i>Luis Barbera, Adolfo Crespo, Pablo Viveros, Christopher Nikulin</i>	
<b>Equipment Utilization Tracking and Improvement in Semiconductor Industry in Probe and Final Test Areas</b> .....	127
<i>Manuel J. Moreno Lizaranzu, Federico Cuesta Rojo</i>	
<b>Developing Advanced Context Aware Tools for Mobile Maintenance</b> .....	133
<i>P. Pistofidis, C. Emmanouilidis</i>	

<b>A Standard-based Data Model for Configuration Management and Maintenance Support .....</b>	<b>139</b>
<i>Eduardo Gilabert, Egoitz Conde, Jon Abaunza</i>	
<b>Value Assessment of an E-Maintenance Platform .....</b>	<b>145</b>
<i>Marco Macchi, Luis Barbera Martinez, Adolfo Crespo Marquez</i>	
<b>Maintenance Solutions for Continuous &amp; Cost-effective Improvement of Wind Turbine Performance .....</b>	<b>151</b>
<i>Basim Al-Najjar, Matias T. Hailemariam</i>	
<b>A Case Study of GAMM (Graphical Analysis for Maintenance Management) Applied to Water Pumps in a Sewage Treatment Plant, Chile.....</b>	<b>157</b>
<i>Luis Barbera, Adolfo Crespo, Pablo Viveros, Raul Stegmaier</i>	
<b>Reference Process for Problem Management Maturity Assessment in the Telecommunication Sector .....</b>	<b>163</b>
<i>Luca Fumagalli, Stefano Farina, Marco Macchi, Mauro Mancini, Stefano Sala</i>	
<b>Modeling Framework Based on SysML and AltaRica Data Flow Languages for Developing Models to Support Complex Maintenance Program Quantification .....</b>	<b>169</b>
<i>T. Ruin, E. Levrat, B. Lung</i>	
<b>Performance Evaluation of Centralized Maintenance Workshop by Using Queuing Networks .....</b>	<b>175</b>
<i>Zineb Simeu-Abazi, Maria Di Mascolo, Eric Gascard</i>	
<b>Sustainable Order Quantity of Repairable Spare Parts.....</b>	<b>181</b>
<i>S. Digiesi, G. Mossa, S. Rubino</i>	
<b>New Variable Health Threshold Based on the Life Observed for Improving the Scheduled Maintenance of a Wind Turbine .....</b>	<b>187</b>
<i>Rodrigo J. A. Vieira, Matteo Lietti, Miguel A. Sanz-Bobi</i>	
<b>Choquet Integral Parameters Inference for Health Indicators Fusion within Multi-Levels Industrial Systems: Application to Components in Series .....</b>	<b>193</b>
<i>B. Abichou, A. Voisin, B. Lung</i>	
<b>Condition Based Maintenance in Small Industries.....</b>	<b>199</b>
<i>Maria Carmen Carnero</i>	
<b>The Effect of Current Military Maintenance Practices and Regulations on the Implementation of Integrated Vehicle Health Management Technology.....</b>	<b>205</b>
<i>Manuel Esperon-Miguez, Philip John, Ian K. Jennions</i>	
<b>Actualized Reliability Model Based on Degradation Data and Maintenance Optimization.....</b>	<b>211</b>
<i>Christophe Letot, Pierre Dehombreux</i>	
<b>RAM Analysis of Mining Process: A Case Study of a Copper Smelting Process in the Field of Mining, Chile.....</b>	<b>217</b>
<i>Luis Barbera, Adolfo Crespo, Pablo Viveros, Fredy Kristjanpoller</i>	
<b>NHPP Applied to the Repair Warranty of an Industrial Asset .....</b>	<b>223</b>
<i>V. Gonzalez-Prida, L. Barbera, A. Crespo, C. Parra</i>	
<b>Optimization of Maintenance Actions for a Multi-component Control System and for Planned Mission Duration.....</b>	<b>228</b>
<i>Z. Imam, B. Conrard, M. Bayart</i>	
<b>Author Index</b>	