

Ordering No.: MASTER

# **Mechanical Analysis and Other Specialized Techniques for Enhancing Reliability (MASTER)**

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ISBN-10: 1-933904-39-9 (Hardcopy)

ISBN-13: 978-1-933904-39-9 (Hardcopy)

ISBN-10: 1-933904-40-2 (PDF Download)

ISBN-13: 978-1-933904-40-5 (PDF Download)

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188		
Public reporting burden for this collection is estimated to average 1 hour per response including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports(0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a current or valid OMB control number. <b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b>					
1. REPORT DATE 1 March 2012		2. REPORT TYPE Technical		3. DATES COVERED (From - To) N/A	
4. TITLE AND SUBTITLE  MASTER – Mechanical Analysis and Other Specialized Techniques for Enhancing Reliability			5a. CONTRACT NUMBER HC1047-05-D-4005		
			5b. GRANT NUMBER N/A		
			5c. PROGRAM ELEMENT NUMBER N/A		
6. AUTHORS  David Rose, Alex MacDiarmid, Paul Lein, Preston MacDiarmid, David Nicholls, Kaushik Chatterjee, Elias Zeilah, Mohammad Modarres			5d. PROJECT NUMBER N/A		
			5e. TASK NUMBER N/A		
			5f. WORK UNIT NUMBER N/A		
7. PERFORMING ORGANIZATIONS NAME(S) AND ADDRESS(ES)  Reliability Information Analysis Center 100 Seymour Rd. Suite C101 Utica, NY 13502-1311			8. PERFORMING ORGANIZATION REPORT NUMBER  MASTER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)  Defense Technical Information Center DTIC-I 8725 John J. Kingman Rd. STE 0944 Ft. Belvoir, VA 22060			10. SPONSORING/MONITOR'S ACRONYM(S)  DTIC-I and AFRL/RIED		
			11. SPONSORING/MONITOR'S REPORT NUMBERS N/A		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited.					
13. SUPPLEMENTARY NOTES Hardcopies available from Reliability Information Analysis Center, 100 Seymour Rd., Suite C101, Utica, NY 13502-1311. (Price: \$120 US/\$135 Non-US). PDF Download available from <a href="http://theRIAC.org">http://theRIAC.org</a> (Price \$100).					
14. ABSTRACT The level of reliability achieved by a system or product is instrumental to its success in today's resource-limited and highly competitive global markets. This is the case for effective military systems, as well as for successful commercial products. Achieved reliability may be relatively simple to quantify (e.g., military maintenance metrics, product warranty returns, customer complaints, etc.), but the results will also impact qualitative concerns that the company must be willing to address in order to succeed, such as: liability, competitiveness, ability to enter new markets and even worker satisfaction. Reliability is also a major factor in many forms of cost: rework costs, maintenance/support costs, warranty costs and life-cycle costs (total ownership costs). The basis for understanding mechanical reliability is focused on the process of mechanical failure at the part and material level. The process of mechanical failure is described by the failure mechanism, which can be traced to various technical disciplines such as fracture mechanics, tribology, material science, physics, chemistry, metallurgy, etc. Mechanical reliability extensively involves durability analysis, which has been used for years to determine safety margins for bridges, aircraft wings and many other items.  The subject of mechanical part reliability cannot begin without introducing the reader to some important underlying reliability and associated concepts that are included in Section 1. Much of the content of Sections 1 and 2 is adapted from two other popular RIAC publications: "RIAC Blueprints for Product Reliability" and the "System Reliability Toolkit". If the reader is already familiar with general reliability concepts, he or she can begin with Section 3, "The Mechanical Reliability Process".					
15. SUBJECT TERMS Design for Reliability    Weibull Parameters    Mechanical Reliability    Design of Experiments    FMEA    FTA Failure Modes    Failure Mechanisms    Stress-Strength    Reliability Growth    Reliability Test    FRACAS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
UNCLASSIFIED					UNLIMITED
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (include area code)
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED			315.351.4202

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