

Airworthiness, CBM and HUMS Specialists' Meeting 2013

**Huntsville, Alabama, USA
11-13 February 2013**

ISBN: 978-1-62993-123-4

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© (2013) by the American Helicopter Society International
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact the American Helicopter Society International
at the address below.

American Helicopter Society International
217 N. Washington Street
Alexandria, VA 22314-2538

Phone (703) 684-6777
Fax: (703) 739-9279

staff@vtol.org

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
Web: www.proceedings.com

TABLE OF CONTENTS

CIVIL ROTORCRAFT OPERATIONS

Health Usage Administration Monitoring System (HUMS)	1
<i>Lance Gant</i>	
Condition Based Maintenance Within the Civil Helicopter Industry	8
<i>Kevin Russell</i>	
A New Approach to Helicopter Maintenance Development	15
<i>Brian Jenkins</i>	
OGP Helicopter Safety and HUMS	35
<i>Grant Campbell</i>	
HUMS Implementation in Civil Ops: IHST Promotional Efforts	44
<i>Stuart Lau, Jason Alamond, Lance Antolick, Danny Green</i>	

CIVIL HUMS APPLICATIONS

Aviation Vibration Data	58
<i>Jason Alamond</i>	
Aviation Vibration Data Processing In Support of CBM: Airworthiness, CBM and HUMS Specialists’ Meeting	73
<i>Danny Green</i>	
Health & Usage Monitoring Systems (HUMS)	89
<i>Dave Squires</i>	
A Large Helicopter Operator Perspective HUMS, HFDM & CBM	102
<i>Rick Barnett</i>	
Aircraft Data Monitoring Systems	114
<i>Tim Doucet</i>	

ROTORCRAFT AND HUMS OEM PERSPECTIVES

HUMS Technology Update	119
<i>Ray Dora</i>	
HUMS Data Management and Case Histories	125
<i>Murdock Welborn, Rob Richardson</i>	
Commercial IVHM Status	140
<i>Brian Tucker</i>	
Waveguide Vibration Sensor for Mechanical System Health Monitoring	154
<i>Chris Larsen</i>	
Simplified Usage Monitoring System for Fatigue Damage Calculation	164
<i>Brian Tucker, Stephen Johnston, Rebecca Yu, Treven Baker, Bruce Thompson, Nathaniel Bordick</i>	
Integrated Fluid Monitor for Health Usage Monitoring Systems	188
<i>Pat Henning</i>	
Evaluation of a Novel Adaptive Alert Generation Technology on a Hums-Equipped Fleet	200
<i>Kenneth Pipe, Bernadette Culkin</i>	
Nonlinear Vibration-Interaction Metric for Health Assessment of Helicopter Drivetrain Systems	207
<i>Mohammed A. Hassan, Yong-June Shin, Abdel Bayoumi, Joshua Tarbuton, Les Eisner, Jerry Higman</i>	

EMERGING MAINTENANCE TECHNOLOGIES

An Alternative Approach to Anomaly Detection in Health and Usage Monitoring Systems – Mixture Modeling	215
<i>Dean Westerfield, Christopher Doktor</i>	
Development of Engineering Standards for Dynamic Thresholding and Trend Alert Technology for Application to a HUMS - Equipped Fleet	243
<i>Steven Krick, Daniel Wade</i>	
Data Quality Assurance for CBM Sensors	248
<i>Jeremy Branning, Matt Szelistowski, Stephen Potts</i>	

Probabilistic Fatigue Damage Modeling for the Reliability Based Rotorcraft Component Life Assessment Using HUMS	256
<i>Chang-Hee Hong, Douglas Algera, Harrison Chin</i>	
Condition Monitoring using Standoff Vibration Sensing Radar	275
<i>Raj Bharadwaj, Dinkar Mylaraswamy, Kyusung Kim, Andrzej Peczalski, Jacob McVay, Alex Cao, Abdel Bayoumi, Adam Miracle</i>	
Parametric Data Reduction Tool (PADRT)	283
<i>Samuel S. Evans, Robert L. Walter, David Boylan, Douglas H. McCall, David Swanson</i>	
In-Flight Tuning: Concept, Realization and Application	292
<i>Daniel Furst, Uwe Arnold, Douglas Graham</i>	
Government Open Binary Format of the Army Bulk Aviation Condition-Based Maintenance Files	310
<i>David Noever, Tien Vu, Dennis Dunaway, Michelle Moorefield, Gail Cruce</i>	
Application of Advanced Vibration Techniques for Enhancing Bearing Diagnostics on a HUMS - Equipped Fleet	314
<i>Lance Antolick, Daniel Wade, Nathan G. Brower</i>	

MILITARY OPERATIONS AND CBM RESULTS

Army Aviation CBM+ and Cost - Wise Readiness	322
<i>Josh Kennedy</i>	
OH-58D Structural Health Monitoring System	325
<i>Amrita Kumar, David Zhang, Franklin Li, Shawn Beard, Howard Chung, Patrick Pollock, Sang Jun Lee, Mark Pappakostas, Roy Ikegami, Nathaniel Bordick, Chris Hodges</i>	
Return on Investment: Analysis of Benefits of the Implementation of Elastomeric Wedges as Vibration Control on the Apache (AH-64D) Aircraft	336
<i>Erin L. Ballentine, Adam Miracle, Abdel Bayoumi, Michele K. Platt, Les Eisner</i>	
Continued Evaluation of Gear Condition Indicator Performance on Rotorcraft Fleet	344
<i>Irebert R. Delgado, Paula J. Dempsey, Lance Antolick, Daniel Wade</i>	
HUMS Experience on the Republic of Singapore Air Force AH64D Tail Rotor Gearbox	366
<i>Reuben Lim, Andy Chiang</i>	
AH-64D Swashplate Test Stands: Improving Understanding of Component Behavior in Rotorcraft Swashplates through External Sensors	378
<i>Travis Edwards, Thomas Hartmann, Andrew Patterson, Samuel Bernstel, Joshua Tarbutton, Abdel Bayoumi, Damian Carr, Les Eisner</i>	
Military Airworthiness for CBM and HUMS: Processes, Policies, Qualification Standards, and Testing for US Army Rotorcraft Propulsion Systems	383
<i>Tim Rickmeyer, Dan Wade</i>	
Application of Natural Language Processing Techniques to Marine V-22 Maintenance Data	463
<i>Huston Bokinsky, Amber McKenzie, Abdel Bayoumi, Rhea McCaslin, Andrew Patterson, Manton Matthews, Joseph Schmidley, Lester Eisner</i>	
Flying CBM+ Integration Lab	473
<i>Howard Blair, Stephen Meizoso, Mary Nelson</i>	
A Study of Nanoparticle Additives on The Performance of the AH-64 Intermediate Gearbox Lubricant to Achieve CBM Objectives	481
<i>Kareem Gouda, Mohsen Nikhoo, Steve Marcous, A. Abdel-Bayoumi, Joshua Tarbutton, Kenneth Eberts, Ganesh Skandan, Damian Carr, Les Eisner</i>	
Author Index	