

*Pursuing prognostic and health
management capabilities for
military and commercial systems*

MFPT 



TECHNICAL PROGRAM FOR THE

MFPT 2010 CONFERENCE

Transition: From R & D To Product

13-15 APRIL 2010
HUNTSVILLE, ALABAMA



Welcome ...

Dear MFPT 2010 Conference Attendees:

On behalf of the Society for Machinery Failure Prevention Technology I would like to welcome you to The Westin hotel, Huntsville, Alabama and the 64th meeting of the Society for Machinery Failure Prevention Technology.

This promises to be another outstanding program with excellent paper presentations and a slate of very stimulating and valuable tutorial and keynote speaker sessions. The theme for this year's conference, ***Transition: From R&D to Product***, is certainly relevant to all of our failure prevention efforts and is particularly important at this time of economic and business uncertainty. We are all being challenged to deliver more and better results with fewer staff, in shorter time frames, and with reduced resources. Coming together as a group to share ideas and techniques, learn from the experts, and explore new opportunities is important for the continued success of each of us and for the success of our organizations.



I would like to recognize the outstanding leadership and untiring support in organizing this conference by Mr. Chris Pomfret, MFPT Executive Director, and Mr. Rick Wade, MFPT Administrative Officer along with the assistance provided by the other Board Members. The work by the Conference team has succeeded in reaching out to bring the best of the best to present at this year's conference and address emerging technologies and promote application deployment.

We are in a new city for this year's conference - Huntsville, Alabama. Huntsville is a vibrant, growing city that provides new opportunities for exchanging information and building relationships with new individuals and new companies. I invite you to get the most out of this conference by connecting; connecting to the papers and presenters, to the vendors and the exhibits, and to the outstanding keynote presentations and their ideas.

Thank you for attending the MFPT 2010 Conference. I wish you all a very successful and rewarding conference.

Fred M. Discenzo, Ph.D.

Chairman, MFPT Board of Directors

CONFERENCE THEME

The theme of MFPT 2010 is:

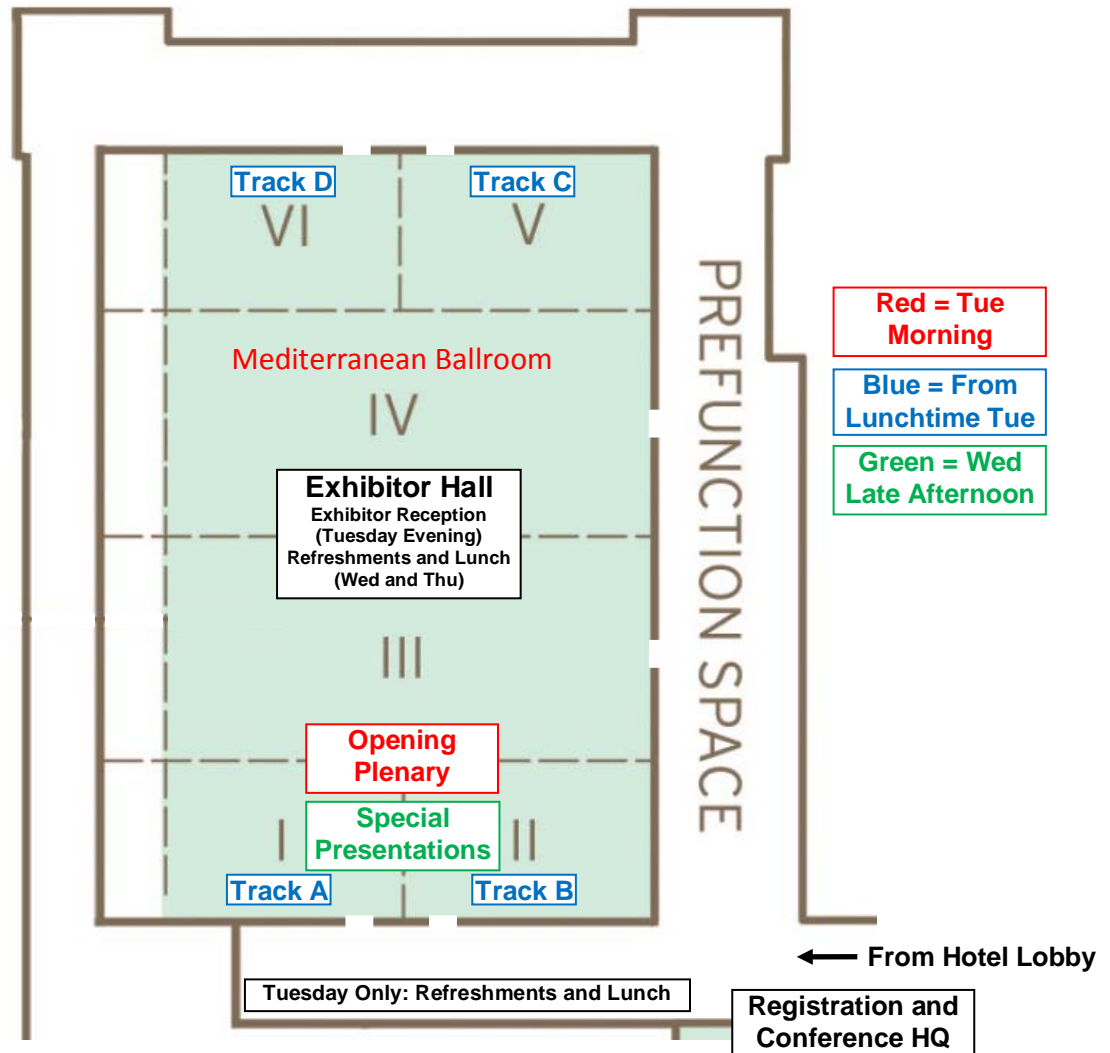
“Transition: From R&D to Product”

Following on from last year’s theme, the MFPT 2010 Conference theme was again chosen to give authors and presenters the opportunity to highlight as many examples as possible where technologies have transitioned from the research and development arena through to real and successful products that have been implemented on systems in service and used to good effect.

TECHNICAL PROGRAM

In addition to two plenary sessions, eleven paper sessions arranged in four tracks have been organized over the two-and-a-half days of the conference, covering an extensive range of failure prevention topics (see Pages 11 to 19). The Technical Program also includes 6 tutorials, descriptions of which are on Pages 20 to 22.

Sessions will be run in four parallel tracks titled A to D, each track being assigned to a particular room; for example Track A comprises Sessions 1A to 4A, and will be held in Mediterranean Ballroom I. Please see the diagram below for the rooms assigned to each track:



REGISTRATION AND INFORMATION DESK

The information and message center will be located in the registration area where telephone messages (via 256 428-2000) and special notices will be posted. Callers leaving messages should ask for the MFPT 2010 Registration Desk.

Dates and Times Registration Desk is Open

| | | |
|------------------|--------|--------------------|
| Monday | 12 Apr | 8:00 pm – 10:00 pm |
| Tuesday | 13 Apr | 7:30 am – 5:00 pm |
| Wednesday | 14 Apr | 7:30 am – 5:00 pm |
| Thursday | 15 Apr | 7:30 am – 2:00 pm |

REFRESHMENTS, SOCIAL AND NETWORKING ACTIVITIES

Breakfast (available from 7:00 am), lunch, and mid-session breaks will be available on Tue, Wed and Thu. From the start of the Conference through Tuesday afternoon break, refreshments will be situated adjacent to registration; after that they will move to the Exhibitor Hall. And don't forget the Exhibitor Reception on Tuesday evening – see below – an excellent opportunity for networking with your failure prevention colleagues!

Exhibitors' Reception

5:00-8:00 pm
Tuesday, 13 April 2010

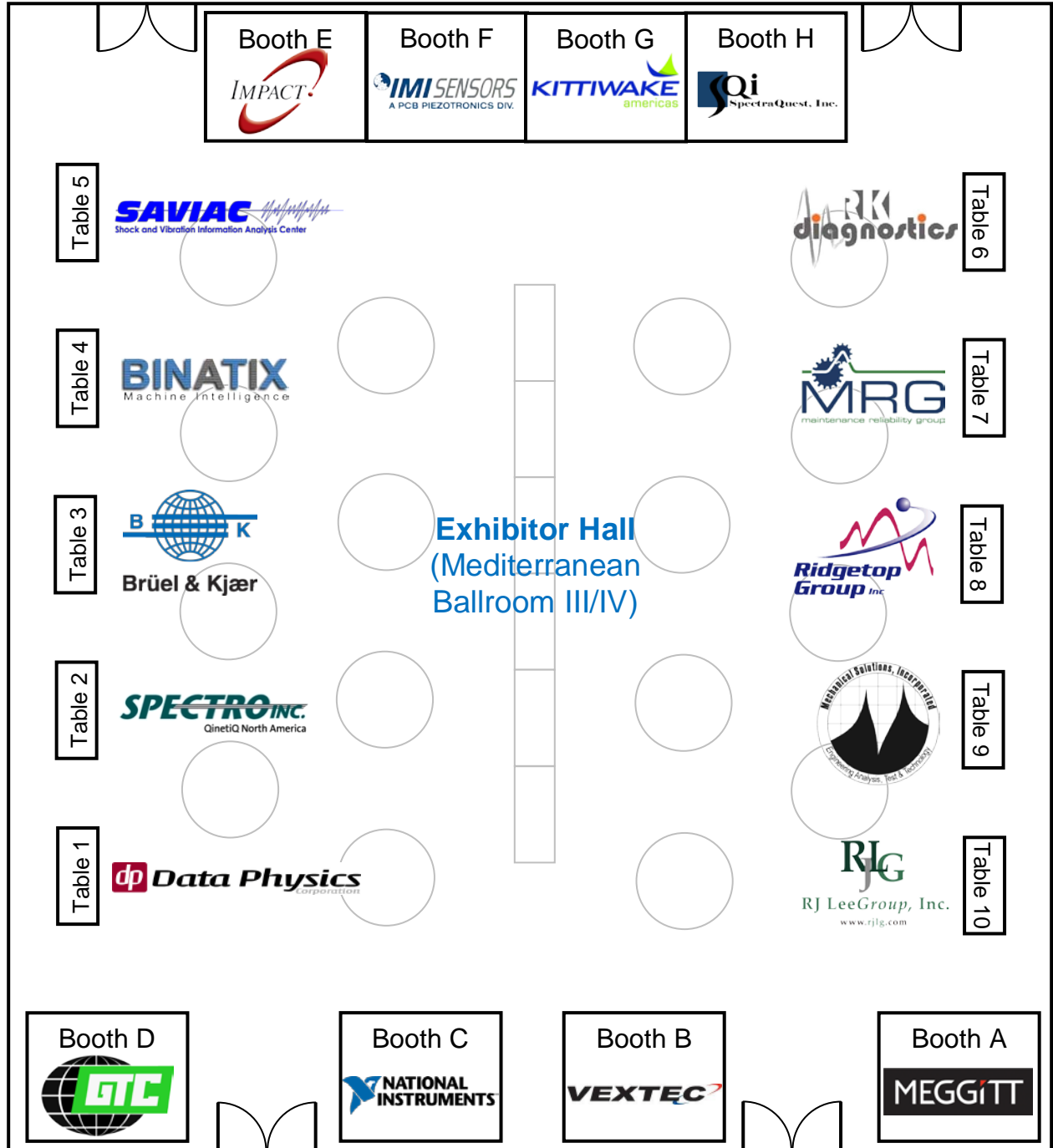
In the *Exhibitor Hall*
(Mediterranean Ballroom III/IV)
The Westin

EXHIBITOR HALL

The Exhibitor Hall will be open as follows:

| | | |
|---------------------------------|----------------------------------|--|
| Exhibitor Setup: | Tuesday , 13 April 2010 | 3:00-5:00 pm |
| Principal Exhibit Hours: | Tuesday , 13 April 2010 | 5:00-8:00 pm ¹ Exhibitors' Reception |
| Principal Exhibit Hours: | Wednesday , 14 April 2010 | 7:30-8:30 am ¹ Breakfast 10:00-10:30 am ¹ Morning Break Noon-1:30 pm ¹ Lunch 3:00-3:30 pm ¹ Afternoon Break |
| Principal Exhibit Hours: | Thursday , 15 April 2010 | 7:30-8:30 am ¹ Breakfast 10:00-10:30 am ¹ Morning Break Noon-1:15 pm ¹ Lunch |
| Exhibitor Tear Down: | Thursday , 15 April 2010 | From 1:30 pm |

¹ These are the principal exhibitor traffic times; however, the Exhibitor Hall will be open through the day should exhibitors wish to man their booths or meet with attendees at other times.



Foyer/Prefunction Space

CONFERENCE ATTIRE

Business casual, or business, is acceptable attire for the Conference.

PAPER AND TUTORIAL ABSTRACTS

Full abstracts for the conference [papers](#) (in alphabetical order of session title) and [tutorials](#) can be found on the MFPT website.

MFPT HONORS AND AWARDS

MFPT recognizes individuals who are cornerstones in failure prevention and MFPT's achievements in the three following ways.

Fellows of the MFPT Society

Up to two fellows of the MFPT Society may be elected each year. Nominations for fellowship are proposed by members of the MFPT Board of Directors and considered by the MFPT Chairman, Vice Chairman the Executive Director. Fellows are elected because of their outstanding and devoted service to the MFPT Society over an extended period of time. Candidates for MFPT Fellowship will be individuals who are held in high regard in the failure prevention community in general, and will have made significant contributions to the failure prevention field. Although not exclusively the case, candidates will normally be serving, or will have served, on the MFPT Board of Directors. MFPT Fellows are welcome to attend MFPT Board of Directors' meetings.

The following individuals have been elected to Fellowship of the MFPT Society:



Elected 2009

Henry C Pusey



Elected 2009

Christopher P Nemarich



Elected 2001

Paul L Howard



Elected 1998

Dr Howard A Gaberson



Elected 1997

Henry R (Hank) Hegner



Elected 1996

The late John L (Jack) Frarey

Jack Frarey Award for Excellence in the Field of Machinery Failure Prevention Technology

The late Jack Frarey excelled in many aspects of the field of Machinery Failure Prevention Technology, his contributions making a significant impact in the field, and inspiring his colleagues. The Jack Frarey award recognizes annually the outstanding contributions to this field of individuals or organizations that best emulate the spirit and personal dedication that Jack brought to this endeavor. At MFPT 2010, the third recipient of this award will be announced.



April 2009

Dr Michael J Roemer



May 2008

Dr Howard A Gaberson

Henry and Sallie Pusey “Best Paper” Award

First introduced at MFPT 61 in April 2007, this award reflects the many years of hard work, dedication, and professionalism shown by Henry and Sallie Pusey that established the high standards of excellence that MFPT enjoys today. The award thus exemplifies the highest levels of excellence in technical contribution, clarity, and professionalism of all the written papers submitted for the MFPT annual Conference. The next recipient will be announced at MFPT 2010.

The following papers have been awarded the Henry and Sallie Pusey Best Paper Award:

| | | |
|---------------------|--|---|
| MFPT 2009 | "Structural Health Monitoring of Large Scale Composite Structures using the Structural Irregularity and Damage Evaluation Routine" | Roger M Crane, US Naval Surface Warfare Center, Carderock Division, and Colin P Ratcliffe, US Naval Academy Mechanical Engineering Department |
| MFPT 62 2008 | "Prognostics of Electronics Under Vibration Using Acceleration Sensors" | Jie Gu, Donald Barker, and Michael Pecht of the Center for Advanced Life Cycle Engineering (CALCE), University of Maryland |
| MFPT 61 2007 | "Agent-based Health Monitoring Architecture for Power Systems" | by Guangfan Zhang, Bulent Ayhan, Roger Xu, Margaret Lyell, William Krueger, and Leonard Haynes of Intelligent Automation Inc. |

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[Hank Hegner](#)

[Mike Roemer, PhD](#)
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MFPT FOCUS GROUPS – POSITION DESCRIPTIONS FOR CHAIRS

MFPT Focus Group Chairs promote their technical area of expertise and are the MFPT Society’s driving force in moving forward the state-of-the-art. They accomplish this by creating, growing and leading a group of interested individuals (the focus group) who are linked through their involvement in MFPT activities. In addition to being a member of the Board of Directors, MFPT focus group chairs promote the aims of MFPT through:

- a. Maintaining a focus group roster containing the contact details of those who share an active interest in the focus group subject matter.
- b. Providing MFPT HQ with names and contact details of individuals potentially interested in MFPT activities so that they can be added to the MFPT mailing list.
- c. Developing and maintaining aims and objectives for their focus group.
- d. Communicating routinely with their focus group on technical matters so as to promote a spirit of cooperation and to exchange information of value.
- e. Soliciting papers, tutorials and other items of interest from their focus group members, and others, for possible inclusion in the MFPT Society annual conference.
- f. Obtaining or writing articles for the MFPT Society newsletters.
- g. Encouraging focus group members to attend the MFPT annual conference and to promote the Society and the annual conference to others.
- h. Holding a focus group meeting at the annual conference to recruit new members and further develop and promote their focus group’s aims and objectives.
- i. Acting as an ambassador and publicist for MFPT to their specific workplace and the community at large.

MFPT 2010 attendees are strongly encouraged to participate in any of the focus group meetings held during the Conference and to join the focus groups and contribute to their activities. See the meetings listed below or, alternatively, track down the focus group chairs listed on the page opposite.

| Focus Group Meeting | Meeting Day/Time | Location |
|----------------------------|---|---------------------------|
| Prognostics | 12:30 PM (Lunchtime) Tue 13 April | Mediterranean Ballroom V |
| Sensors Technology | 7:30 AM (Breakfast) Wed 14 April | Mediterranean Ballroom V |
| Data Management | 10:30 AM (as part of Interactive Session) Wed 14 April | Mediterranean Ballroom VI |
| Failure Analysis | 12:30 PM (Lunchtime) Wed 14 April | Mediterranean Ballroom V |
| Diagnostics | 5:15 PM (Evening) Wed 14 April | Mediterranean Ballroom V |
| Systems Engineering | 7:30 AM (Breakfast) Thu 15 April | Mediterranean Ballroom V |



EXHIBITOR PRIZE DRAW

Be sure to enter the Exhibitor Prize Draw to have a chance to win an **iPod touch**, a **\$50 Best Buy Gift Card** or an **MFPT Polo Shirt**





How to participate:

1. Visit **all of the exhibitors** and have them mark their company slot on your Exhibitor Prize Draw Entry Form
2. Bring the completed Entry Form to the Registration Desk **before the end of the morning break on Thursday**
3. Attend the draw on **Thursday at 12:15 pm** in the Exhibitor Hall

You must be present at the draw to win!

Tuesday April 13 - Morning

| | | |
|-----------|---|--|
| From 7 AM | Breakfast (Adjacent to Registration) | |
| | Opening Plenary Session - <i>Mediterranean Ballroom I/II/III</i> | |
| 8:30 AM | Welcome | Fred Discenzo PhD - Chairman, MFPT Society Board of Directors |
| | Welcome | Ron Eshleman, PhD - Chairman, The Vibration Institute |
| | Remarks | Chris Pomfret - Executive Director, MFPT Society |
| 9:00 AM | Introduction of MFPT Board of Directors and Focus Group Chairs | Chris Pomfret and BoD Members |
| 9:15 AM | First Keynote | Mr Chris Smith - Director, CBM, US Army Aviation and Missile Command: <i>"Implementation and Cost Benefits of CBM+ in Army Aviation"</i> |
| 10:00 AM | Break (Adjacent to Registration) | |
| 10:30 AM |  Second Keynote | Brett Commander PE - Bridge Diagnostics, Inc: <i>"Is Structural Health Monitoring All that it is Cracked Up to Be?"</i> |
| 11:15 AM |  Third Keynote | Prof Len Gelman - Cranfield University, UK: <i>"Signal Processing for Condition Monitoring—Present and Future"</i> |
| 12:00 PM | Presentation of Awards: Henry and Sallie Pusey Best Paper Award Jack Frarey Memorial Award for Excellence | Marc Pepi - to introduce awards Fred Discenzo PhD - to present award Fred Discenzo PhD - to present award |
| 12:15 PM | Lunch (Adjacent to Registration) 12:30 PM - Prognostics Focus Group Meeting (Mediterranean Ballroom V) - All Welcome! | |

Tuesday April 13 - Afternoon

Session 1A - Mediterranean Ballroom I

Paper Session
Electronics and Power Systems Health
Management

Chair - **J B Shroeder**,
US Air Force Research Laboratory

Session 1B - Mediterranean Ballroom II

Paper Session
Signal Analysis

Chair - **Joe Sheeley**,
Arnold AFB, AEDC

1:30 PM *Reduce the Chances of Murphy's Law from Disrupting Electrical Systems and Equipment*, **George Zeigler**, Signals Power and Grounding Specialists, Inc

2:00 PM *(Electrical) Power Systems Health Management for Unmanned Aircraft*, **Mark Walker**, General Atomics

2:30 PM *Fault Tolerance for Actuators with Extended Operation under Transistor Trigger Suppression and Winding Fault Isolation*, **Antonio Ginart**, Impact Technologies, LLC

3:00 PM Break (Adjacent to Registration)

3:30 PM *Model-Based Avionics Systems Fault Simulation and Detection*, **Chetan Kulkarni**, Vanderbilt University

4:00 PM *A Prognostics Approach for Electronic Damage Propagation and Analysis in Electromechanical Actuator Systems*, **Sonia Vohnout**, Ridgetop Group, Inc.

4:30 PM *Innovative IEEE 1451 Power System Prognostic Sensor*, **Sonia Vohnout**, Ridgetop Group, Inc.

5:00 PM -
8:00 PM

Exhibitors' Reception (Mediterranean Ballroom III/IV)

1:30 PM *Applications of Analysis of Means Techniques to Operational Data for Ground Vehicle Diagnostics*, **Matt Rigdon**, Penn State University Applied Research Laboratory

2:00 PM *On the Use of the Hilbert Transform for Amplitude and Phase Demodulation Applications*, **Arun Menon**, Data Physics Corporation

2:30 PM *So You Think You are Making Accurate Measurements?*, **David Corelli**, PCB Piezotronics

3:00 PM Break (Adjacent to Registration)

3:30 PM *New Time-frequency Adaptive Techniques for Damage Diagnosis in Non-stationary Conditions*, **Len Gelman**, Cranfield University

4:00 PM *Hybrid Ceramic Bearing Prognostics using Particle Filtering*, **David He**, University of Illinois-Chicago

4:30 PM *Applying Modal Analysis to Improve Machinery Reliability - Using Modal Analysis to Identify & Resolve Machinery Reliability Issues*, **Stanley Bognatz**, M&B Engineered Solutions, Inc

Tuesday April 13 - Afternoon

| Session 1C - Mediterranean Ballroom V | | Session 1D - Mediterranean Ballroom VI | |
|---|---|--|---|
| Tutorial Fracture Analysis for Maintenance Engineers | | Paper Session CBM | |
| Debbie Aliya, Aliya Analytical | | Chair - Vern Fox, BAE Systems | |
| 1:30 PM | Tutorial - for a full description see Page 20 | 1:30 PM | <i>Reliability Centered Maintenance: Determining Metrics That Drive the Bottom Line</i> , Dennis Moore , RJ LeeGroup Inc |
| | | 2:00 PM | <i>Streamlined Grease Sampling and Analysis to Complement Vibration and Other Diagnostic Technologies</i> , Richard Wurzbach , Maintenance Reliability Group, LLC |
| | | 2:30 PM | <i>Development of a Fuel System Advanced Diagnostic and Predictive Capability for the M2/M3 Bradley Fighting Vehicle</i> , Jeffrey Banks , Penn State University Applied Research Laboratory |
| 3:00 PM | Break (Adjacent to Registration) | 3:00 PM | Break (Adjacent to Registration) |
| 3:30 PM | Tutorial - for a full description see Page 20 | 3:30 PM | <i>Mashups to Support CBM+ Software Application Transition from R&D to Product</i> , Matt Sedlak , RJ LeeGroup Inc |
| | | 4:00 PM | <i>The P-F Interval: The Cornerstone of Condition Based Maintenance</i> , Chris Sautter , University of Alabama in Huntsville |
| | | 4:30 PM | <i>Transitional Failure Testing and Prognostics Software Development Applied to Helicopter Critical Component</i> , Romano Patrick , Impact Technologies, LLC |
| 5:00 PM - 8:00 PM | Exhibitors' Reception (Mediterranean Ballroom III/IV) | | |

Wednesday April 14 - Morning

From 7 AM Breakfast (Mediterranean Ballroom III/IV)
7:30 AM - Sensors Technology Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Session 2A - Mediterranean Ballroom I

Session 2B - Mediterranean Ballroom II

Paper Session
Health Management Tools and Capabilities

Paper Session
Diagnostics

Chair - Kai Goebel,
NASA Ames Research Center

Chair - Mark Hollins/Nichelle Brown,
US Navy Air Weapons Center,
Aircraft Division

8:30 AM *Detecting Bearing and Gear Failures through At-Line Wear Debris Analysis, Allison Toms, GasTOPS Inc.*

8:30 AM *Case Study: New Pump Installation Analysis of Excessive Vibration, Ken Singleton, KSC Consulting LLC and Bob McGinnis, MM Engineering*

9:00 AM *Real-time Oil Quality and Metallic Debris Monitor for Gearbox Applications, Carl Byington, Impact Technologies LLC*

9:00 AM *Induction Motor Power Quality in Rotating Machines under Faults, Suri Ganeriwala, Spectra Quest Inc*

9:30 AM *"Site-Direct" Oil Analysis completes the Condition Monitoring goal of Continuous Machine Monitoring, Jack Poley, Condition Monitoring International LLC*

9:30 AM *Evidential Reasoning Applied to Model-Based Diagnostics in Landing Gear Actuators, Paul Phillips, University of Manchester*

10:00 AM Break (Mediterranean Ballroom III/IV)

10:00 AM Break (Mediterranean Ballroom III/IV)

10:30 AM *A Model-based Reasoning Framework for Prognostics and Health Management, Mark Walker, General Atomics*

10:30 AM *Crack Fault Diagnosis in Drive Shafts Using Inverse Method, David He, University of Illinois-Chicago*

11:00 AM *Bringing the Benefits of Integrated Vehicle Health Management to Unmanned Systems, Mike Schoeller, Impact Technologies LLC*

11:00 AM *Extended Range RF Technology for Wireless Industrial Vibration Sensors, David Corelli, PCB Piezotronics*

11:30 AM *Active Electrical and Mechanical Techniques for Modal Analysis of Operating Equipment, Bill Marscher, Mechanical Solutions Inc*

11:30 AM *Adapting Advanced Pattern Recognition Software to Predict and Optimize Pulverizer Performance, Nilimb Misal, Engineering Consultant Group Inc*

12:00 PM Lunch (Mediterranean Ballroom III/IV)
12:30 PM - Failure Analysis Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Wednesday April 14 - Morning

From 7 AM Breakfast (Mediterranean Ballroom III/IV)
7:30 AM - Sensors Technology Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Session 2C - Mediterranean Ballroom V

Session 2D - Mediterranean Ballroom VI

Paper Session
Failure Analysis

Tutorial
followed by
Interactive Session with Attendees
Data Management

Chair - Marc Pepi,
US Army Research Laboratory

See Below

8:30 AM *Improving the Reliability of Large Diesel Engine Turbochargers, **Edgar Gunter**, RODYN Vibration Analysis, Inc.*

8:30 AM *Tutorial:*

9:00 AM *Materials Testing and Specimen Selection for Failure Analysis Support, **Debbie Aliya**, Aliya Analytical*

Federated Architecture: Moving Beyond the Silos
Harlan Shober,
RJ LeeGroup
- for a full description see Page 20

9:30 AM *Predicting Fatigue Failure Using Intrinsic Material Properties, **Rich Holmes**, VEXTEC Corporation*

10:00 AM Break (Mediterranean Ballroom III/IV)

10:00 AM Break (Mediterranean Ballroom III/IV)

10:30 AM *Root Cause Analysis of Turbine Generator Vibration from Mechanical, Thermal, and Electrical Faults, **Marco Cafilisch**, Failure Analysis Associates*

10:30 AM *Interactive Session:*

11:00 AM *Assessment of Aircraft Stairway Welds, **Marc Pepi**, US Army Research Laboratory*

Data Management Issues
Chris Sautter,
University of Alabama Huntsville
- for a full description see Page 21

11:30 AM *Design for Testability: Anticipating Sensor Requirements through Advanced Failure Analysis, **Chris Stecki**, PHM Technology*

12:00 PM Lunch (Mediterranean Ballroom III/IV)
12:30 PM - Failure Analysis Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Wednesday April 14 - Afternoon

Session 3A - *Mediterranean Ballroom I*

Tutorial
**Digitizing the Material World: Using
 Physics-based Computational Material
 Simulation to Predict Long Term
 Durability**

Animesh Dey,
 Vextec

Session 3B - *Mediterranean Ballroom II*

Paper Session
Material Health Management

Chair - **Bill Marscher**,
 Mechanical Solutions

1:30 PM

Tutorial - for a full description see Page 21

1:30 PM

*Advances in Non-Contacting Stress
 Measurement for Turbomachinery Blades,*
Mike Platt, Mechanical Solutions, Inc.

2:00 PM

*Characterization of Fatigue Damage and
 Residual Life Time Assessment by Fractal
 Analysis of the Deformation Structure,*
Jürgen Schreiber, Fraunhofer-Institute for
 Non-destructive Testing, Dresden Branch

3:00 PM

Break (*Mediterranean Ballroom III/IV*)

3:00 PM

Break (*Mediterranean Ballroom III/IV*)

Special Presentations Session - *Mediterranean Ballroom I/II*

Chair - **Fred Discenzo**,
 Rockwell Automation (MFPT Chairman)

3:30 PM

Intermittent Fault Detection and Isolation System Expanding Role,
Ken Anderson, Universal Synaptics

4:00 PM

Innovations from CBM Research including the Business Case Analysis,
Abdel Bayoumi, University of South Carolina

4:30 PM -
 5:00 PM

How Opportunistic is it for Prognostics Products to Transition?,
Phil Dussault, US Army AMRDEC Diagnostic/Prognostic Lab

5:15 PM

Diagnostics Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Wednesday April 14 - Afternoon

Session 3C - Mediterranean Ballroom V

Tutorial
Diagnostic Sensors for EHM Systems

Chris Nemarich,
US Navy Military Sealift Command HQ

Session 3D - Mediterranean Ballroom VI

Paper Session
**Business Cases/Economic Benefits/
 Performance Based Logistics**

Chair - Ash Thakker,
Global Technology Connection

1:30 PM

Tutorial - for a full description see Page 22

1:30 PM

*Estimating Prognostic Benefit for High Valued Components in Repairable Systems, **Gregory Kott**, Xerox Innovation Group*

2:00 PM *Consideration of Tangibles and Intangibles to Show Economic Benefit of Prognostics and Health Management, **Joel Luna**, Frontier Technology Inc*

2:30 PM *NDIA EHM Study Report, **Paul Howard**, Paul L Howard Enterprises*

3:00 PM

Break (Mediterranean Ballroom III/IV)

3:00 PM

Break (Mediterranean Ballroom III/IV)

Special Presentations Session - Mediterranean Ballroom I/II

Chair - Fred Discenzo,
Rockwell Automation (MFPT Chairman)

3:30 PM

Intermittent Fault Detection and Isolation System Expanding Role,
Ken Anderson, Universal Synaptics

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Innovations from CBM Research including the Business Case Analysis,
Abdel Bayoumi, University of South Carolina

4:30 PM -
5:00 PM

How Opportunistic is it for Prognostics Products to Transition?,
Phil Dussault, US Army AMRDEC Diagnostic/Prognostic Lab

5:15 PM

Diagnostics Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Thursday April 15 - Morning

From 7 AM

Breakfast (Mediterranean Ballroom III/IV)
 7:30 AM - Systems Engineering Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Session 4A - Mediterranean Ballroom I

Session 4B - Mediterranean Ballroom II

Paper Session
Health Management Strategies

Tutorial
**Cepstrum Analysis for Machine
 Diagnostics and Operational Modal
 Analysis**

Chair - **Betty Glass**,
 Lockheed Martin

Bob Randall,
 University of New South Wales

8:30 AM

Small Turbine Engine Testing for Cost-Effective Health Prognosis, **Richard Holmes**, VEXTEC Corporation

8:30 AM

Tutorial - for a full description see Page 22

9:00 AM

Autonomic Integrated Prognostics Health Management Systems: Concepts and Designs, **Sonia Vohnout**, Ridgetop Group, Inc.

9:30 AM

Automated Contingency Management (ACM) for Overactuated Systems, **Brian Bole**, Georgia Tech

10:00 AM

Break (Mediterranean Ballroom III/IV)

10:00 AM

Break (Mediterranean Ballroom III/IV)

10:30 AM

Agent-based Automated Algorithm Generator, **Geoffery Zhang**, Intelligent Automation, Inc.

10:30 AM

Tutorial - for a full description see Page 22

11:00 AM

Realizing The Value: Transitioning a Proof of Concept Prototype into a Fully Functional Product, **Dennis Moore**, RJ LeeGroup Inc

11:30 AM

A Survey on Prognostic Metrics, **Leandro Barajas**, General Motors R&D Center

12:00 PM -
 1:30 PM

Lunch (Mediterranean Ballroom III/IV)

12:15 PM

Exhibitor Prize Draw (Mediterranean Ballroom III/IV)
Must be Present to Win!

Thursday April 15 - Morning

From 7 AM

Breakfast (Mediterranean Ballroom III/IV)
 7:30 AM - Systems Engineering Focus Group Meeting (Mediterranean Ballroom V) - All Welcome!

Session 4C - Mediterranean Ballroom V

Paper Sessions
**Systems Engineering and
 Health Management Applications**

Chair - **James Hofmeister**,
 Ridgetop Group

Session 4D - Mediterranean Ballroom VI

Paper Session
Data/Knowledge Management

Chair - **Bob Lawton**,
 General Dynamics IT

8:30 AM

The Decision Analysis Process, **John Lucero**, NASA John H Glenn Research Center

8:30 AM

Cloud Computing Architecture for Manufacturing Data Management, **Amit Deshpande**, TechSolve, Inc.

9:00 AM

Heavy Lift Launch Vehicle Payload Fairing Structural Concept Down Select Process, **John Lucero**, NASA John H Glenn Research Center

9:00 AM

A Survey of Rotating Machinery Condition Indicators, **Joe Sheeley**, Arnold AFB, AEDC

9:30 AM

Machine Tool Health Monitoring Using Prognostic Health Monitoring Software, **Radu Pavel**, TechSolve, Inc. and **Nick Frankle**, Frontier Technology Inc

Moving Beyond Advanced Analysis to Data Management and Decision Making, **Mike Denton**, National Instruments

10:00 AM

Break (Mediterranean Ballroom III/IV)

10:00 AM

Break (Mediterranean Ballroom III/IV)

10:30 AM

Shape Classification Particle Counting and Emission Spectroscopy for Wear Debris Analysis – Current and Future Trends, **Dan Walsh** and **Suneet Chadha**, Spectro Inc

10:30 AM

Web 2.0: Forming a Collaborative Information Enterprise, **Matt Sedlak**, RJ LeeGroup Inc

11:00 AM

Shipboard Automated Maintenance Management System, **Randy Torfin**, US Navy Military Sealift Command

11:30 AM

Environment for Processing of Wideband Signals, **Renata Klein**, R.K. Diagnostics

12:00 PM -
 1:30 PM

Lunch (Mediterranean Ballroom III/IV)

12:15 PM

Exhibitor Prize Draw (Mediterranean Ballroom III/IV)
Must be Present to Win!

Session 1C - Mediterranean Ballroom V**Tutorial
Fracture Analysis for Maintenance Engineers**

Debbie Aliya,
Aliya Analytical

This seminar will go over the basics of determining whether single or repeated loads caused fracture. It will also discuss how to tell what stress type (stretching, squeezing, bending or twisting) causes what shape of component fragments for basic geometries, including cylinders, plates, and solid rectangular shapes, when the material involved is ductile (such as mild steel) and when it is a brittle material (such as cast iron). The value of doing additional tests in certain circumstances will also be described. One use of this information would be to give the maintenance engineer tools to determine whether failures are normal or possibly due to poor design, in a fact based way that can be presented to equipment manufacturers. Machine designers could also benefit from this material.

[Please see the MFPT website for a more detailed breakdown](#)

Session 2D (Before Break) - Mediterranean Ballroom VI**Tutorial
Federated Architecture: Moving Beyond the Silos**

Harlan Shober,
RJ LeeGroup

The tutorial will outline the challenges with data integration between disparate systems often referred to as “data silos”. Not covered in the presentation are the reasons behind the data integration. In this respect each integration effort is different from the next. What is discussed, is how new technologies and methodologies such as federated security and Web 2.0 methods (Service Oriented Architecture or SOA) can be applied to the problem.

Within any large enterprise or amongst a group of enterprises the challenges of securely sharing data are numerous. From firewalls and VPNs to application logins there are roadblocks to sharing data. Data, in turn is virtually locked away in silos controlled and leveraged only by the data generators.

This presentation explores an enterprise architecture that helps to break down the barriers to cross domain, cross network, cross system, and cross application communication of data assets.

[Please see the MFPT website for a more detailed breakdown](#)

Session 2D (After Break) - Mediterranean Ballroom VI**Interactive Session
Data Management Issues**

Chris Sautter,
University of Alabama Huntsville

Data Management is appearing to become the 8,000lb gorilla that the community is needing to tame. While sophisticated tools, algorithms and capabilities have been successfully developed over the past decade for determining the health of a system and prognosing when a failure will occur in the future, the growing issues now seem to be associated with data, e.g., (a) how to handle the large volume of data from say a sizeable fleet of aircraft that can each generate Gbytes of data from each sortie, (b) what data parameters to collect and/or store (c) capably and efficiently fusing widely disparate data and (d) whether data can be artificially generated to cover missing data or gaps in datasets. This interactive discussion will elicit opinions, statements of need and offers of pertinent capabilities from participants and capture a consensus of views as well as factual information to help the community better understand the size and possible solutions to these problems.

[Please see the MFPT website for a more detailed breakdown](#)

Session 3A - Mediterranean Ballroom I**Tutorial
Digitizing the Material World: Using Physics-based Computational Material Simulation to Predict Long Term Durability**

Animesh Dey,
Vextec

Traditional industry approaches to durability prediction have focused on gathering physical data test points and using FEA stress models. Consequently, these methods ignore the fact that not all components fail according to their FEA models, and do not take into account the material's varying response to the stresses it is subjected to. Furthermore, since these traditional methods do not differentiate for various damage mechanisms, nor do they provide a quantitative analysis in predicting the risk of failure, they make it difficult to predict the full range of performance, durability or failure. No one can afford the time or money required to physically test the complete range of in-service conditions possible; therefore engineers are forced to build in design margins or knock-down factors (often as high as 10X), which add weight, restrict operating performance, reduce efficiency, and raise operating costs.

It has now been possible to develop a more accurate, cost-effective approach to durability prediction. Simulations are built on a computational framework that utilizes physics-based material micromechanics to predict the damage state, and a probabilistic approach to variability to accurately quantify risk of failure. This approach, and its advantages, will be explained in this tutorial.

[Please see the MFPT website for a more detailed breakdown](#)

Session 3C - Mediterranean Ballroom V**Tutorial**
Diagnostic Sensors for EHM Systems

Chris Nemarich,
US Navy Military Sealift Command HQ

This tutorial presents an overview of diagnostic sensors that can be used in equipment health monitoring systems with the emphasis on sensors that can be integrated into automated machinery control systems. The tutorial will acquaint the attendee with the variety of sensor technologies available and present a methodology for selecting the 'best' sensor technology for the application. Sensor measurement basics and terminology such as range, span, resolution and hysteresis will be covered. The fundamentals of the most commonly used sensors (temperature and pressure) will be presented in detail. Other topics covered will include: sensor signal conditioning, analog vs digital sensors, smart sensor interfaces, using existing process control sensors for fault detection and diagnosis, and recent advances in sensor technology.

[Please see the MFPT website for a more detailed breakdown](#)

Session 4B - Mediterranean Ballroom II**Tutorial**
Cepstrum Analysis for Machine Diagnostics and Operational Modal Analysis

Bob Randall,
University of New South Wales

The cepstrum is basically the inverse Fourier transform of a logarithmic spectrum, but has a number of variants. This gives two main application areas in machine dynamics, the first being diagnostic, and the second to do with determination of structural dynamic properties. The diagnostic application is based on the fact that many faults in machines (such as in gears and bearings) give rise to families of uniformly spaced components (harmonics and sidebands) in response spectra. These are much more evident on log amplitude than on linear amplitude scales. In the cepstrum, whole families of harmonics and sidebands are collected into a single dominant component, with a very accurate measure of the average spacing, and the ability to detect patterns not obvious to the eye. The application to operational modal analysis is based on the fact that the cepstrum of a response signal can be divided into its components from the forcing function and transfer function, thus allowing determination of the structural dynamic properties from response measurements alone. For SIMO (single input, multiple output) systems, the cepstrum of each output signal is the sum of the cepstra of the forcing function and the system properties.

[Please see the MFPT website for a more detailed breakdown](#)

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