MFPT News Winter 2023

VI + MFPT: Diagnostics, Prognostics and Failure Prevention

Niagara Falls, NY
July 26 – July 28th, 2023

MFPT at VIATC 2022 Call for Papers & Presentations

The Society for Machinery Failure and Prevention Technology (MFPT) is proud to announce its call for papers and presentations for our 2023 annual conference, co-located with the Vibration Institutes annual meeting in Niagara Falls, NY, July 26th – 28th, 2023.

2023 Conference Link

Contact Us

Society for Machinery Failure Prevention Technology

MFPT Website

Contact Us

Chairman's Letter

Let me start off by wishing everyone a Happy New Year. I am excited to be the new chairman of the Society for Machine Failure Prevention Technology and look forward to a prosperous and successful 2023.

I also wanted to say thank you to Preston Johnson for leading the MFPT for these last 3 years. He did a great job and the MFPT will benefit from Preston's continued involvement as Annual Meeting Program Chair

Looking back on 2022 before we look forward into 2023, we must reflect on what we achieved. The 2022 highlight are both the successful Annual Conference in Savanah Georgia this summer, which we hosted in conjunction with the Vibration institute. At this year's conference we had over 270 attendees, 41 Vendors, and 2 Keynote and 4 invited speakers.

The other highlight for 2022 was the establishment of the new "FLUID SYSTEMS DIAGNOSTIC TECHNOLOGY FOCUS GROUP" the scope of which is the understanding of the failure modes and diagnostics for fluid systems. This new focus group will be headed by

Looking forward to 2023, the big focus is this year's annual conference at the Niagara Falls Convention Center, in Niagara Falls New York from **July 26 – 28**.

We hope to see you all in Niagara Falls.

Best Regards,

Suri Ganeriwala, Chairman, MFPT

Articles

Looking Back at 2022, Looking Forward to 2023

The Society for Machinery Failure Prevention Technologies annual meetings are THE technical conference for machine failure prevention and vibration analyst professionals featuring dozens of case studies, in-depth advanced training, and a show floor packed with the latest technology. MFPT is happy to share some of the highlights of MFPT 2022, with a look forward to MFPT 2023.

Looking Back at MFPT 2022:

The combined Vibration Institute and Society for Machinery Failure Prevention Technology annual meeting August 3rd through 5th, 2022 was an excellent event. There were over 40 exhibitors, 6 parallel tracks, and 5 keynote speakers. MFPT provided a wide range of presentations, workshops, and keynotes.

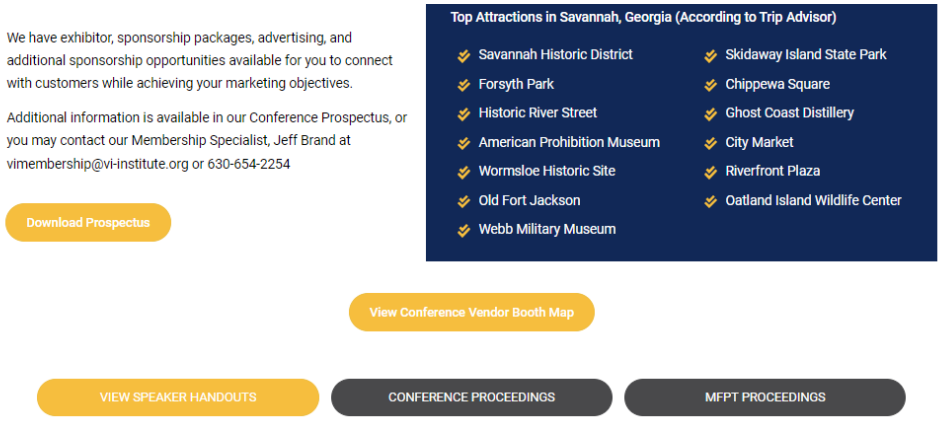
Sessions
Small Turbofan Engine as Risk Reduction for Technology Maturation
Utilizing Motor Data as Sensors for Machine Learning and Augmented Intelligence for Advanced Failure Notification, Classification and Time to Failure Estimation
US NAVY Remote Monitoring and Condition Based Maintenance+ Programs
NASA Systems Engineering and Safety Culture: Aerospace Project Design and Implementation Challenges
The National Shipbuilding Research Program: Overview of Electrical Safety Initiatives & Focus Areas
HUMS II Health and Usage Monitoring with Operating Regime Identification
Scaling Machine Reliability and Scaling the Power of VAs with AI-driven Machine Health
Hands-on Demonstration Machine Health Monitoring and Diagnostics Using a Cell Phone Video
Vibration Resonance Spectrometry (VRS) for Advanced Streaming Prognostics of Complex Engineering Assets
Deep Learning Based Machine Failure Prevention for Mission-Critical Systems
Using Creative Synchronous Averaging for Detecting Defects of a Belt-Driven Bevel Gearbox
Specifying Sensors and Measurement Technology
Model (Data Engineering), Monitor, Analyze (Reliability)
Cepstrum Editing Techniques for Enhancing Bearing Fault Diagnosis
Overview of NASA's Advanced Air Transport Technology and Revolutionary Vertical Lift Technology Projects, with a Focus on Failure Prevention Research
Towards a Hybrid Physical-AI based Approach for Fault Diagnosis of Gears
Analytical treatment of Transient torsional vibrations and mitigation devices
Towards the Development of Operational Digital Twin
Validation of torsional model of rotating machinery through various measurement techniques

Accelerometer Performance Impact on IoT for CBM
Lubrication Monitoring's Role in Realizing the Benefits Autonomous Operation
Catalyst Failure Analysis on a Reactive Silencers
The Next Level: Pushing the Limits of Vibration Transmitters
Design of Reliable Robotic Systems for Machinery Inspection
Digital Worker, Augmented Reality, Training and Failure Prevention
Fiber Optic Sensing Applied to Structural and Machinery Health Monitoring
Fluid Systems Diagnostic Technology and Focus Group Formation
Insight Driven Operation for Utilities: Driving Performance with Data
½ Day Workshops
De-Mystifying Wireless Sensors with Hands on Acquisition and Analysis
Introduction To Digital Twin, Analytics, and Prognostics for the Condition Monitoring Expert
Keynotes
Systems Health Decision Making: Transitioning from Equipment Monitoring to Systems Health Management
Model-Based and Data-Driven Methods for Cyber Physical Systems Condition Monitoring and Health Management

If you have a Vibration Institute membership, you can find the proceedings and presentation handouts here:

https://www.vi-institute.org/viatc2022-conference/

Look about two thirds of the way down the page, to find:



Passwords: Viatc2022 Viatc2022-MFPT

If you have trouble locating some of the material, please contact Preston Johnson at preston.todd.johnson@gmail.com.

Looking Forward to MFPT 2023:

MFPT will again co-locate with the Vibration Institute annual meeting in 2023, in beautiful Niagara Falls, NY, USA.

MFPT Website Discussion

The MFPT line up of speakers and presentations is action packed. While our line-up is almost complete, we do have a few 30-minute presentation slots available. Here is what you can expect at MFPT 2023.

Title
Analysis of Reciprocating Machinery based on Crank-Angle Data
Empirical Procedure for Balancing 1st and 2nd System Critical Speeds
Rotating Rake Mode Measurement System – Signal Collection and Analysis Techniques
Track this Bearing for me Please
Can a Cell Phone Video Complement Accelerometer Measurements?
Novel concept of flexible autonomous condition monitoring system based on reductive-redundant (RR) algorithm and statistical scores
Changing Artificial Ignorance into Intelligence
Asset Health Management Utilizing Batch Multivariate Pattern Analysis
Lessons Learned in Building a Digital Twin in a Chemical Plant
Using AI to advance Predictive Maintenance in Power Generation
A Digital Twin Architecture from Ontology for Diagnostics and Prognostics
Change Detection for Improved Maintenance Notification
Clustering-based signal segmentation methods with robust statistics in application to non-Gaussian health index data segmentation
Defect Severity Measurement in Variable Speed Rolling Element Bearings
Separation of vibratory components in complex systems for condition monitoring
Having a Sensor Does Not Make a PdM Program
Extending Energy Storage Life of IOT Sensors
Digital Bus Based Vibration Sensors
IEPE vibration sensors with self-calibration capability
Damage Detection and Monitoring of Wind Turbines and Related Structures
At-Machine and Remote testing options for Grease Lubricated Machinery
Failure can be the catalyst in improving a CBM Program
Application of Combined Oil Health and Vibration Sensor to Gear Drive Systems
Centrifugal Compressor Rotor Dynamics
Maximizing Value from your Remote Condition Monitoring Program on Rotating Machines: Parameters to Measure

How Accurate are Video Vibration Measurements?
Electrical Signature Analysis of Oil and Dry Type Transformers
Identifying tool wear in turning using vibration signals and artificial neural network classifier
Design and Fabrication of a Lifetime Test Apparatus for Compressor Valve Condition Monitoring
Condition Monitoring of Reciprocating Compressor Valves via a Statistical Time-Frequency Approach
High Sensitivity Stran Gauge and Unique Applications
Mitigation of Excessive Vibration at Motor NDE to Resonance with Tuned Mass Damper
Identifying machinery anomalies using shape identification and classification algorithm
Demystifying Shaft/Coupling Misalignment Signature using Vibration Analysis
Leveraging the Industrial Metaverse for Digital Twins

MFPT Annual Meetings, not to be missed.

The MFPT annual meetings are a not to be missed event for machinery failure prevention professionals. Our Society focuses on several areas, which combine to educate our audience on a holistic view of failure prevention. These focus areas include:

- Data Management and Artificial Intelligence
- Diagnostics and Prognostics
- Failure Analysis
- Lubrication Sensing, Systems, and Analysis
- Human Performance Monitoring
- Sensor Technologies
- Sensor Signal Analysis
- Systems Engineering

As always, feel free to visit us on LinkedIn at the Society for Machinery Failure Prevention Technology group: https://www.linkedin.com/groups/8920840/ or at our website at https://www.mfpt.org/

We look forward to seeing you in Niagara Falls.

Preston Johnson,

MFPT 2023 Annual Meeting Program Chair

Preparing the Team for the Digital Twin Implementation Journey

In my last article, I introduced several technical components you might include in your digital twin efforts. These include equipment condition monitoring, process monitoring, digital worker, networking/connectivity, analytics, data management, and asset + process management, and visibility dashboards. Within each of these, there are several software applications available on the market. I also shared that it takes a team to implement the digital twin, including operations, maintenance, reliability, information technology, leadership, and perhaps most importantly an integration team to stitch the digital twin components together.

With all this in place, it sounds like we are ready to begin our journey. Well, what if some of our target end users are resistant to change. You might hear "I have always done it this way, it works, why change?" "It is too much effort and expense". "I do not see the value." How do we get our target end users excited about the changes a digital twin application will bring? This is where change management steps in.

Move the people from the current state, through a transitional state, and into a desired future state

Your organization is a collection of people pursuing a common interest. People, however, have minds of their own. People have their own experiences, fears, and desires. We need to align these with the future state, so the people willingly participate.

Organizational Change Management (OCM) describes an approach to managing changes in a way that minimizes disruption to operations and productivity, while maximizing the positive results of change. OCM in its simplest terms includes:

- Getting people to understand the change
- Getting people to desire the change
- Getting people to participate in actions required for the change

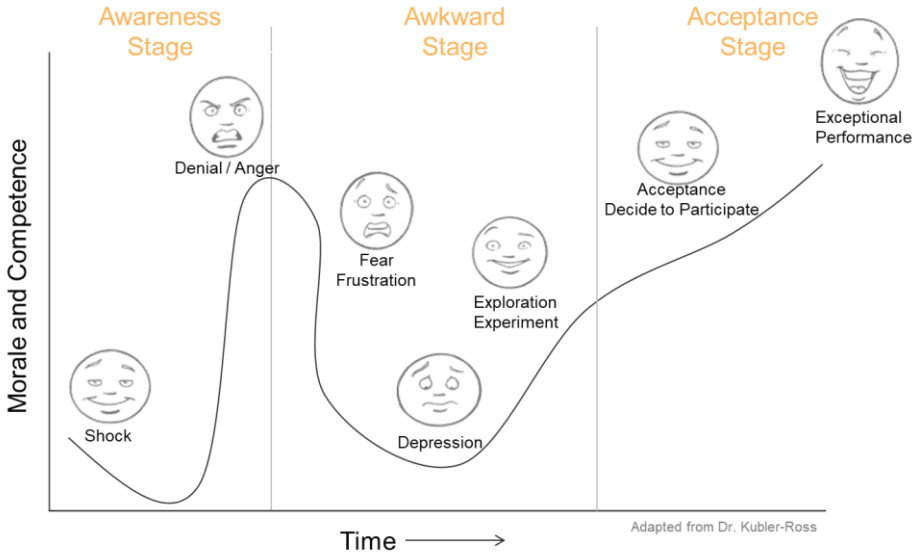
To be clear, leadership plays a key role in change management, setting the vision, and supporting the effort to undertake the change journey. In this article, we focus on OCM for technology implementation. People have emotions that cannot be ignored.

People and Emotions

Below is a graphic that shows the ebb and flow of people's emotions along the digitalization change journey. Along with our technology implementation, we need to address these expected emotions to ensure we get to the future state of our technical implementation without delay.

We need to coach the participants and the rest of the organizational personnel through the 7 phases of the emotions. On the X-axis of the graph is morale and competence. One might think of this as the productivity scale. The 7 phases of the emotional journey are:

- Shock: It is a surprise. How does it impact my job, and my friends/colleagues?
- Denial: Pretend the change does not exist. (Productivity returns to "normal")
- Frustration: People are asked to participate in the new technological changes.
- Depression: The change is inevitable, I must deal with it, I do not see the value.
- Experiment: I'll experiment, maybe it is not all that bad.
- Decision: I can live with the new technology; I see some benefits.
- Integration: It is now normal, using technology, with improved productivity.



Emotional Stages Graph

For example, a maintenance technician, quality inspector, or an assembly operator who performs repetitive tasks will likely be threatened by our technology changes. Senior management is responsible for demonstrating how the new technology simplifies the daily routine AND empowers the individual to achieve higher levels of performance.

To begin, we need to understand three core elements.

- Who will the technology changes affect the most?
- What are the impacts of the change (for the individual)?
- How might the individual feel about and receive the change?

Key tasks for the Change Management Leader

Change management must be driven by transparency, inclusiveness, and reskilling. Senior management must deliver transparent communications and discuss the consequential impact of the changes.

Change management must include and involve employees at the grassroots level, those affected by the change. Identification of the supporters who will "own" their part of the change and will serve as champions to socialize the benefits of the technology change. The change management leader, in concert with the identified supporters, must help other employees see the benefits of the technology change and feel comfortable with the change. Change cannot be forced.

It is likely there is some reskilling to do. This gives those employees the opportunity to grow in their career, and their role within the company.

Change management must include sharing a vision, the plan to get there, the resources and activities along the way, the inclusion necessary so people choose to participate, and a way to measure progress and success.

Summary

To start the change management process, it is a must to engage leadership immediately. The digital twin implementation can be a significant change for the organization. The digital twin implementation needs visible, consistent, and committed leadership support. To help with leadership support, consider conducting a strategic alignment meeting and discuss the project vision statement.

Be careful to understand the impacts of change. How does the work change for impacted employees? Consider a transition team to help employees participate and develop a sensor of ownership for the new system(s). Training will play a significant role, such that employees have an opportunity to learn the new and provide feedback. Create incentives for the employees to participate.

Measure progress and success. Such progress and success measures should be part of the ongoing communication. Measurement shows concrete movement towards the future state and provides the opportunity to reiterate the benefits of arriving at the future state.

References:

1: "Organizational Change Management for Dummies", 2015, John Wiley and Sons, Inc.

2: "A Low-Risk, Incremental Approach to Smart Manufacturing for Small & Medium Manufactures", MESA International, Smart Manufacturing Working Group.

About the Author:

Preston Johnson is a Senior Solutions Manager with CB Technologies, Inc. (CBT). CBT is a domain expert systems integrator with deep knowledge in IT and OT systems and integration. As a solutions manager, Preston focuses on Monitoring and Analytics as he assists clients begin their digital journey. Preston is also the Chairman of the Society for Machinery Failure Prevention Technology (MFPT). Preston is MFPT chair of the Data Management and AI focus group, and a fellow of MFPT. Preston can be reached at preston.johnson@cbtechinc.com

When good machines show up with Bad Vibrations – Part

Many times, vibrations results and plots seem baffling where a rotating machinery has passed run test at OEM works, passed the acceptance criteria during tests at commissioning and suddenly trips or start showing high vibrations. The vibration plots start suggesting mechanical malfunctions whereas, after checking the machine installation, they are found to be correct. This technical note describes such abnormalities faced at site .

Case - Operating machine tripped due to high vibration on FD fan NDE side. NDE bearing has two accelerometers and dual RTD, but other accelerometer and Temperature was normal. During start up all the parameters were normal. It looked like a spurious trip event. After this incident, the machine tripped again. It was observed accelerometers were reaching to above high-High vibration stage and trip activating while people were communicating by Radio with control room regarding lube oil leakage issue . It is common to use the radio in refinery during operation is normal, but frequency interference should not impact instrument system. When Walkie Talkie was within one meter radius, there was an interference. When talk mode was used, spikes were higher.

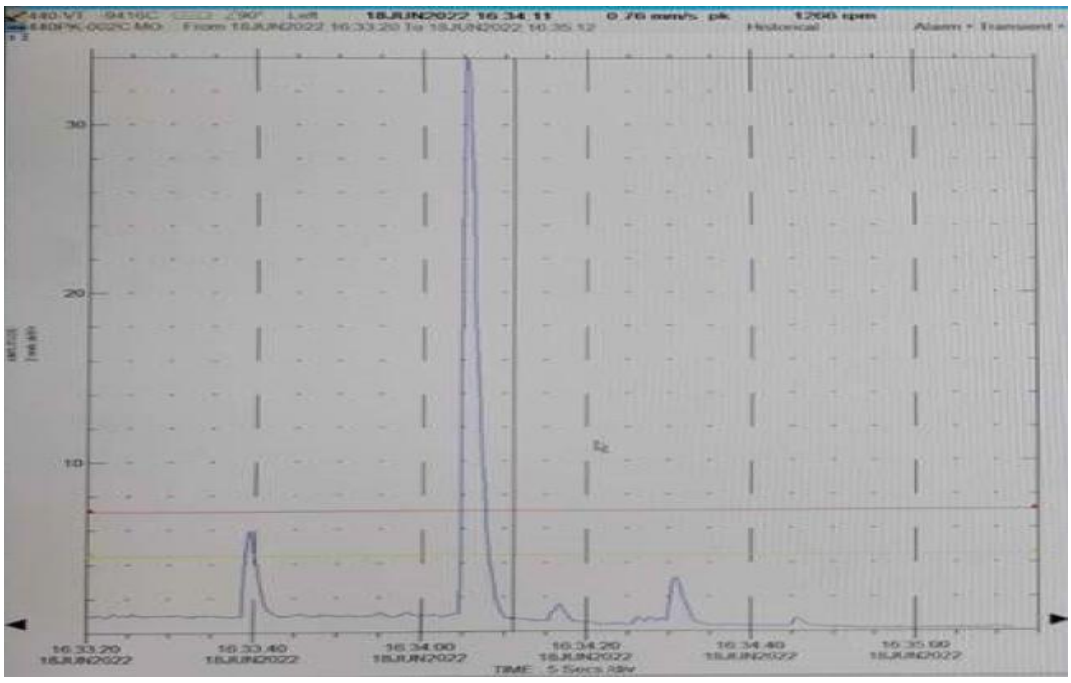


Fig 1 – HH vibration when operator passed by with a walkie talkie in talk mode

However, beyond one meter there were no spikes observed.

After rigorous investigation based on feedback received, Contractor has inferred that this phenomenon is due to Electro Magnetic Interference (EMI), and this can be minimized but cannot be eliminated. Using an appropriate Radio handset and maintaining relative distance (1 meter minimum) spurious tripping can be avoided.

End user reported that there is a potential impact in vibration measurement when Walkie Talkie is in very close proximity. However, beyond one meter the same impact is not observed.

Equipment	Bearing	Excited Frequencies in Spectrum
Motor	NDE	16.875 Hz
		N/A
	DE	16.875 Hz
		16.875 Hz
Pump	DE	16.875 Hz
		16.875 Hz
	NDE	16.875 Hz
		16.875 Hz
		16.875 Hz

Fig 2 – Influence of interference when Walkie talkie is near sensor

Further, End user also suspected that the selected accelerometer probe type is not suitable for that application.

All probable causes were explored such as -

1. Grounding /shielding /installation issue- All the groundings and shielding are checked, verified, and found satisfactory as per standard. Cables are special cable suitable for vibration monitoring application having overall and individual pair screen
2. Inappropriate Probe selection- Accelerometer is the right choice. for condition monitoring of rolling element bearing. The same make and model were used in other equipment installation and no such issues reported.
3. External Walkie Talkie acts as EMI / RFI noise source- Electromagnetic interference (EMI) is a disruption that affects an electrical circuit because of either electromagnetic induction or externally emitted electromagnetic radiation. Any electronic device like Mobile phones, Car remote Key, FM/AM radio, Walkie Talkie can function as EMI source.

Refer - IEC 61000-4-3 Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radiofrequency, electromagnetic field immunity test. However, walkie talkies cause significantly more interference than the mobile phones.

EMI interference is impossible to eliminate but can be minimized with certain precautions such as -

- Using shielded cable (Overall and Individually shielded for each pair) and single point grounding can reduce the impact.
- Maintaining the distance - Keeping the source of radiation away from the affected device can minimize the interference. We maintain a minimum distance between electrical power and instrument signal cable for the same reason.
- Signals - Analogue 4-20 mA signal is inherently more immune to EMI than pulse or frequency signals (such as Vibration). Accelerometer uses piezo electric crystal and associated electronics which works in very

minute voltage (milli volt). This makes such sensors more vulnerable to EMI than 4-20mA signal. In fact, different models of accelerometer also can have different EMI interference levels. Same model in different circuit, different cable length or differently exposed to EMI source can demonstrate different EMI interference behavior.

- Reduce power of the external device: Obviously if the power of the external device / interference source is reduced, induced EMF and EMI will be reduced. This is evident from the test conducted with both 1Watt and 4-Watt Walkie Talkie. The test outcome suggested that Radio handset transmission power and distance from the probe both are the responsible factors for the extent of EMI noise. It is evident that Higher power Radio handset is not advisable to use for operation phase.
- Review of using a High Pass filter (HPF) setting in MCMS rack and masking of EMI frequency. However different devices have different frequencies making it difficult to use the HPF to eliminate all the unwanted frequencies. Further, increasing the HPF might mask the required important spectrum component essential for analysis. For example, if 50 HZ (3000 rpm) is first synchronous speed (1X component) and EMI frequency is 55 Hz, setting HPF at 60 Hz will mask both one times and EMI component. This is normally conducted during the operation period by End User and after having sufficient understanding of spectrum, nature of vibration and EMI sources present.

Normally HPF filter in MMS rack is not a “square filter” but “graded with step.” This means unwanted noise will not be eliminated fully and some noise will continue to appear..

About the Author:

Mantosh Bhattacharya is a Subject Matter Expert in Turbomachinery located in UAE and certified CAT IV vibration analyst. As a Subject Matter Expert, Mantosh focuses on selection and review of technical features of mission critical turbomachinery. Mantosh is an advisory board member in ATPS (Asia Turbomachinery and Pump symposium - Texas A&M TEES) Mantosh is also the Chairperson Failure prevention focus group of the Society for Machinery Failure Prevention Technology (MFPT). Mantosh can be reached at mantosh.b@petrofac.com

VIATC / MFPT 2023

VIATC/MFPT 2023

NIAGARA FALLS, NEW YORK
NIAGARA FALLS CONVENTION CENTER
ROOM BLOCK AT SHERATON NIAGARA FALLS

JULY 26TH - JULY 28TH 2023
PRE CONFERENCE WORKSHOP JULY 25TH

MFPT TECHNICAL CONFERENCE
CELEBRATING THE 50TH ANNIVERSARY OF THE VIBRATION INSTITUTE

2023 Conference Link

Full Technical Program

Exhibiting Companies

Conference Schedule Summary

Monday July 24th
Vibration Analysis Overview (VAO) Course Begins
CAT II Basic Machinery Vibration (BMV) Course Begins
CAT IV Advanced Vibration Analysis (AVA) Course Begins

Tuesday July 25th
Pre-Conference Workshops
(ticket must be purchased in addition to Wednesday - Friday Conference)
Introduction to Machinery Vibration (IMV) Course Begins

Wednesday July 26th
Conference Officially Begins!
Welcome, Keynote Address
Invited Speaker "50 Years of the VI: A Review of the History of the Institute and It's Members" - Tom Spettel, VI Board Member Emeritus
Expo Hall Opens
Vendor/Expo Beer & Wine Reception

Thursday July 27th
Full Conference Day 2
Invited Speaker "50+ Years of Modal Analysis" - Mark Richardson, Ph.D., Vibrant Technologies
MFPT Keynote "Leveraging the Industrial Metaverse for Digital Twins" - Dr. Diego Galar
Expo Hall Open
Vendor/Expo Beer & Wine Reception, Raffle & VI 50th Anniversary Celebration

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Friday July 28th
Full Conference Day 3
Vibration Institute Annual Meeting Presented By: Gyorgy Szasz, Ph.D., VI President & Janine Komornick, Manager of Operations
"A Tribute to Some of the Early Pioneers who are Responsible for the Development of the Vibration Analysis/Machine Failure Prevention Industries"
Tributes to Don Bentley, Jack Frarey, Art Crawford, and Ron Eshleman

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Saturday July 29th
Optional Certification Exam - 8:00am (CAT I - CAT IV)

MFPT Focus Group Areas: https://www.mfpt.org/focus-groups/

The Society's mission (of providing an interchange of technical information for the benefit of owners and operators of mechanical machinery) is facilitated within our focus groups. The focus groups include:

All the focus area disciplines interact with each other. For example, systems engineering identifies functional requirements of equipment and their likely failure modes in the application. This engineering work drives human inspection tasks as well as automated inspections. Sensors give us quantifiable data about the physical world, and signal analysis transforms that data into condition and performance indicators about our equipment. Exploring and interpreting these indicators are diagnostic, prognostic, multivariate data analytics, and analysis of failures. In each of these areas, the performance of the human is always an element of success and efficiency.

Thru discussions in our focus groups, participants gain knowledge that helps drive towards failure prevention within the participant's organization. Our discussion forum (see link above) makes it easy to post a question, comment, article, etc., for all the MFPT community to see.

Each year, we host sessions in each of these areas at our annual conference and our webinars. Join our mailing list to stay informed.

Systems Engineering

FG Chair: John Lucero, NASA, Glenn Research Center

The Systems Engineering Focus Group (SEFG) provides a forum to foster the development and application of a systems approach to complex technical problems. Due to the interdisciplinary technical structure of MFPT, technical processes representing System Design, Technical Management and Product Realization are instrumental in the development and integration of new technologies into mainstream applications. The SEFG will encourage the application of these Systems Engineering tools to problems posed by the MFPT community.

Sensors

FG Chair: Ed Spence, Machine Instrumentation Group

The Sensors Focus Group (SFG) facilitates the discussion of sensors for Machinery Failure Prevention. Discussions include new sensor technologies and the means to connect them, data driven approaches to data analysis, and developments under the Industrial IoT umbrella.

Ed Spence, our Sensors Focus Group Chair, hosted a tutorial:

- Accelerometers for Machine Health Monitoring and Diagnostics

And we hosted several sessions with sensors as the focus:

- Complimenting acceleration measurements with advanced strain gauge technology
- Miniature Solid-State Batteries for High Temperature Industrial Sensors
- Combining Wear Debris and Vibration for a More Complete Understanding of Machinery Health

Signal Analysis

FG Chair: Suri Ganeriwala, SpectraQuest

The Signal Analysis Focus Group (SAFG) facilitates the discussion of data acquisition, signal analysis, diagnostics, artificial intelligence, logicians, etc. A core focus is signal processing (of all sensor type data) to assess the condition of components, subsystems, systems accurately and reliably in enough time to maximize reliability and minimize costs.

Data Management and AI

FG Chair: Preston Johnson, CBT

The Data Management and AI Focus Group (DM&AIFG) supports the discussion of data management tools, capabilities and standards that facilitate the detection and measurement of failure modes; that facilitate monitoring machinery and structural health; and that facilitate maintenance decision making. Participate in

discussion of best practices and options for collection, advanced analysis, and dissemination of technical information for all sensed parameters.

Diagnostics and Prognostics

FG Chair: Hoffy Hoffmeister, Ridge Top Group

The Diagnostics and Prognostics Focus Group (D&PFG) provides a forum to foster professional collaboration in the practice and technology of Prognostics and Health Management (PHM). The D&PFG provides and entry point for members new to the field of PHM and a forum for experienced professionals to collaborate on the most pressing problems. D&PFG encourages the use of standards and the application of PHM techniques across multiple domains.

The MFPT D&PFG is a group of professionals working to advance the field of PHM by collaborating on technical issues and sharing relevant industry information. Sample discussion areas include: Mechanical and electronic PHM, Prognostic methods and technology, PHM Standards, PHM case studies.

Failure Analysis

FG Chair: Mantosh Bhattacharya, Petrofac

The Failure Analysis Focus Group (FAFG) fosters the development, utilization, and enhancement of failure analysis techniques and methodologies. Lessons learned are conveyed to the MFPT Community, to prevent recurrence of failures, saving precious resources. The FAFG engages with other MFPT Focus Groups to show why failure analysis is an integral part of the product life cycle.

Human Systems Monitoring

FG Chair: Mark Derriso, US Airforce

The mission of the Human Systems Monitoring Focus Group (HSMFG) is to create an international forum where academia, industry and government agencies can discuss the state of the art in the area of human monitoring systems technologies. Topics of interest include but are not limited to wearable sensor technologies, data acquisition and management architectures, data analytics and assessment methodologies and health, fitness, and human performance monitoring techniques for industrial and military applications.

The MFPT HSMFG is a group of professionals working to advance the field of human systems monitoring by collaborating on technical issues and sharing relevant methodologies and approaches from academia, industry, and government to advance the state of the art.

Publications:

MFPT members have published several books on failure prevention technology subjects. These include:

- "Prognostics and Health Management: A Practical Approach to Improving System Reliability Using Conditioned-Based Data", co-authored by James P. Hofmeister

  Prognostics and Health Management provides an authoritative guide for an understanding of the rationale and methodologies of a practical approach for improving system reliability using conditioned-based data (CBD) to the monitoring and management of health of systems. This proven approach uses electronic signatures extracted from conditioned-based electrical signals, including those representing physical components, and employs processing methods that include data fusion and transformation, domain transformation, and normalization, canonicalization and signal-level translation to support the determination of predictive diagnostics and prognostics. Written by noted experts in the field, Prognostics and Health Management clearly describes how to extract signatures from conditioned-based data using conditioning methods such as data fusion and transformation, domain transformation, data type transformation and indirect and differential comparison.

- "Condition Monitoring Algorithms in MATLAB®": Offering the first comprehensive and practice-oriented guide to condition monitoring algorithms in MATLAB®, by Adam Jablonski. This book is available from Springer at the above link.

  This book offers the first comprehensive and practice-oriented guide to condition monitoring algorithms in MATLAB®. After a concise introduction to vibration theory and signal processing techniques, the attention is moved to the algorithms. Each signal processing algorithm is presented in depth, from their basics to the applications, including extensive explanations on how to use the corresponding toolbox in MATLAB®. In turn, the book describes several techniques for synthetic signals generation, as well as vibration-based analysis techniques of large data sets. Finally, it shows readers how to directly access data from industrial condition monitoring systems (CMS) using MATLAB® .NET Libraries. Bridging between research and practice, this book offers an extensive guide on condition monitoring algorithms to both scholars and professionals.

Other Publications

The MFPT and VIATC Conference 2021 Proceedings are here.

Sessions include:

- Data Management and AI_Leverage AI for Zero Downtime
- Signal Analysis_Dynamic_Operating_Condition
- Diagnostics_Gas turbine and compressor control
- Diagnostics_Structural Vibrations in Long Shaft Pumps
- Human Performance_AthleteEngineering
- Human Performance_ClosingWearableGap
- Human Performance_Comfort&FitVersusEffectiveness
- Sensors_TD ROSS Rotating Optical
- Diagnostics and Prognostics_CBE Life Curve
- DataMgmt and AI_Model Monitor Analyze to Optimize
- Human Performance_Enhancing Work Execution
- Human Performance_Organizational Performance and RCA
- Sensors_Fluid Sys Analysis & Diagnostic Technolgies
- Human Performance_ Management of Stress
- Signal Analysis_A Pedagogical Approach To Mechanical Vibrations
- Failure Analysis_Cold Spray
- Prognostics_Human Machine
- Diagnostics_Monitoring of Motor Gear

MFPT's 2020 Conference Proceedings are located here. Many of these sessions are listed in the focus group area.

MFPT offered several webinars between our 2020 conference and our 2021 conference. These include

Digitally Enabling Maintenance and Reliability
Model, Monitor, and Analyze a Digital Twin Foundation
Induction Motors and Motor Current Signal Analysis
Using Motion Magnification for Machinery Diagnostics

You will find many of our additional conference publications at MFPT Publications We are working to improve the listing and indexing, yet feel free to search today for your key words.

Going Forward

The Society for Machinery Failure Prevention Technology (MFPT) continues its mission of providing a technical interchange of MFPT topics. We look forward to our conversations, and our in person meeting the week of August 2nd to August 5th, 2022 at the Marriott Riverfront in Savannah, Georgia.

Please also follow MFPT

at MFPT

and on our LinkedIn discussion forum at MFPT: Society for Machinery Failure Prevention Technology

MFPT Discussion Forum

and on Twitter

MFPT on Twitter

join our mailing list at

Mailing List

become a formal member of MFPT by selecting MFPT as your VI-Institute chapter

MFPT Membership