Sixteenth International Conference on Condition Monitoring and Asset Management (CM 2019)

Glasgow, United Kingdom
25-27 June 2019

ISBN: 978-1-5108-8977-4
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<th>Session 1A – Trained structures and statistical methods in CM</th>
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<tr>
<td>11.00</td>
<td>[102] How to reveal the influence of the human factor</td>
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<tr>
<td></td>
<td>Authors - L S Kuravsky and G A Yuryev</td>
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<td></td>
<td>Moscow State University of Psychology and Education, Russia</td>
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<tr>
<td>11.20</td>
<td>[105] Intelligence algorithms for intrusion and anomaly detection in virtual cloud networks, software and experiment design</td>
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<tr>
<td></td>
<td>Author - G Yuryev</td>
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<td></td>
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<tr>
<td>11.40</td>
<td>[108] An intelligent system to support CM for activities of operators of complex technical systems</td>
</tr>
<tr>
<td></td>
<td>Authors - L S Kuravsky and G A Yuryev</td>
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<tr>
<td>12.10</td>
<td>[111] Application of a non-standard approach for diagnostic analysis of vibration waveforms</td>
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<td></td>
<td>Authors - F Y Balitski(^1), G A Yuryev, M A Chervonenkis(^2), A A Konstantinovskiy(^1), A A Shevchenko(^1), S S Isakov(^1) and D P Sincha(^2)</td>
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<td></td>
<td>(^1)Machinery Engineering Research Institute of the Russian Academy of Sciences, Russia</td>
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<td>(^2)Spectrum Engineering, Russia</td>
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<td>12.30</td>
<td>[114] Integral evaluation of the dangerous behaviour probability for computer network users via parameters of their activity</td>
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<tr>
<td></td>
<td>Authors - L S Kuravsky(^1), G A Yuryev, M A Chervonenkis(^2), A A Konstantinovskiy(^1), A A Shevchenko(^1), S S Isakov(^1) and D P Sincha(^2)</td>
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<td>(^2)Pawlin Technologies Company, Russia</td>
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<tr>
<td>12.50</td>
<td>[117] Bayesian evaluation to detect dangerous user behaviour in computer networks: an example of practical application</td>
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<tr>
<td></td>
<td>Authors - A A Shevchenko(^1), A A Konstantinovskiy(^1) and D P Sincha(^2)</td>
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<tr>
<td>13.10</td>
<td>[120] A virtual adaptive simulator as a skill formation tool for the operators of complex technical systems</td>
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<td></td>
<td>Authors - S I Popkov</td>
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<td></td>
<td>Moscow State University of Psychology and Education, Russia</td>
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09.20  **Plenary Keynote Lecture** –


*Author - Dr J Lacaille, Safran Aircraft Engines, France*
*Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria*
Session 1B – Bearing monitoring
Chair: Professor L Wang  Room: The Buchannan

11.00  [103] Invited overview presentation: Smart bearings: past, current and future
Author - L Wang
University of Southampton, UK

11.20  [106] Development of a bearing fault detection and diagnosis suite based on multi-sensing techniques for aero engines
Authors - T J Harvey, I Bashir, K Esmaeili, L Wang, A Weddell, N White and B Zaghari
University of Southampton, UK

11.40  [109] Early detection of white etching crack formation under dynamic loading using electrostatic sensing technique
Authors - K Esmaeili1, L Wang1, T J Harvey1, N M White1 and W Holwegern1,2
1 University of Southampton, UK
2 Schaeffler Technologies GmbH & Co KG, Germany

Optical CM
Chair: Professor P S Heynes  Room: The Buchannan

12.10  [112] Process monitoring and verification of the shot peening process using a pressure sensor and a high-speed camera
Authors - A Aramcharoen, K Ahluwalia and A Teo
Agency for Science, Technology and Research, Singapore

12.30  [115] Computer vision for rail surface defect detection
Authors - P S Heyns, R Deetlefs, A J Oberholster, T R Botha, P S EIs and D H Diamond
University of Pretoria, South Africa
Session 1C – Modelling and identification of blade-based rotor systems for CM  
Chair: Professor F Gu  Room: The Great Western

11.00 [104] Invited overview presentation: A fourth-order synchroextracting transform for the analysis of non-stationary signals with fast varying instantaneous frequency  
Authors - K Yu¹² and T R Lin²  
¹Northeastern University, P R China  
²Qingdao University of Technology, P R China

11.20 [107] Random vibration of a finite element rotor model with crack fault via polynomial chaos expansion  
Authors - C Fu¹², Y Yang², Y Wang², F Gu¹ and A Ball¹  
¹University of Huddersfield, UK  
²Northwestern Polytechnical University, China

11.40 [110] Extraction of information from vibration data using double-density discrete wavelet analysis for CM  
Authors - K Rabeyee, Y Xu, S Alabied, F Gu and A D Ball  
University of Huddersfield, UK

Vibration CM  
Chair: D Whittle  Room: The Buchannan

12.10 [113] Trends in CM for pitch bearings  
Authors - D Sandoval¹², U Leturiondo¹, F Pozo², Y Vidal² and O Salgado¹  
¹IK4-Ikerlan Technology Research Centre, Spain  
²Universitat Politècnica de Catalunya (UPC), Spain

12.30 [116] Data-driven prototype of turbo-engine blade monitoring  
Authors - C Ying, J Lacaille and C Berthou  
Safran Aircraft Engines, France

12.50 [119] A novel implementation of vibration signal decomposition for estimation of degradation in rotating plant  
Authors - B Brown, B Stephen, S McArthur, G West and C Michie  
University of Strathclyde, UK

13.10 [122] Sampling above Nyquist with high resolution  
Author - R F McLean  
Retired
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<th>Time</th>
<th>Session 2A – Modelling and identification of blade-based rotor systems for CM</th>
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<tr>
<td></td>
<td>Author - W Ross, Servowatch Systems, UK</td>
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<td></td>
<td>Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria</td>
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**Session 2A – Modelling and identification of blade-based rotor systems for CM**

*Chair: Professor F Gu  Room: The Victoria*

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<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>15.20</td>
<td>Monitoring of gear wear progressions based on a modulation signal bispectrum analysis of vibration</td>
<td>X Sun¹², R Zhang³, K Lu², A M Ahmada¹, F Gu¹ and T Wang²</td>
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<td>¹University of Huddersfield, UK</td>
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<td>²Taiyuan University of Technology, China</td>
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<tr>
<td>15.40</td>
<td>Time-varying coupled vibration analysis of a ball-screw feed system</td>
<td>Q Wu¹², F Gu¹ and A D Ball²</td>
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<td>¹Lanzhou University of Technology, China</td>
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<td>²University of Huddersfield, UK</td>
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<td>16.00</td>
<td>A homography transformation-based video stabilisation method for structural health monitoring using an unmanned aerial vehicle</td>
<td>M Li¹, F Gu¹, A D Ball¹ and L Song²</td>
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<td>¹University of Huddersfield, UK</td>
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<td>²Chang'an University, China</td>
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</table>
Session 2B – CM of components in rotating machines
Chair: Dr J Liska  Room: The Buchanan

15.20  [125] Vibration monitoring of rotating machine components
Authors - J Liska, J Jakl, S Kunkel, V Vasicek, K Kalista and M Kas
University of West Bohemia, Czech Republic

15.40  [128] Usage of shaft vibration signals for turbine blade monitoring
Authors - J Jakl, J Liska and V Vasicek
University of West Bohemia, Czech Republic

16.00  [131] Torsional vibration encoder-based monitoring methods and their experimental validation
Authors - J Liska, J Jakl and S Kunkel
University of West Bohemia, Czech Republic
Session 2C – Vibration signature analysis of rotor/shaft crack in rotating machinery
Chair: Dr S Ganeriwala  Room: The Great Western

15.20  [126] Turbomachinery vibration analysis case studies: using data from online vibration monitoring systems
   Author - S R Ganti
   Vibration Consultation, India

15.40  [129] Using minimum entropy decomposition and spectral kurtosis for rolling element bearing fault analysis in a permanent magnet motor
   Authors - D Chen and S Ganeriwala
   SpectraQuest Inc, USA

16.00  [132] Determining induction motor air-gap eccentricity using vibration and motor current signature analysis (MCSA)
   Authors - D Chen and S Ganeriwala
   SpectraQuest Inc, USA
Session 3A – Modelling and identification of blade-based rotor systems for CM
Chair: Professor F Gu  Room: The Victoria

16.50 [133] Modelling in-cylinder pressures for accurate simulations of instantaneous angular speed responses to combustion faults in an internal combustion engine powertrain
Authors - Y Xu¹, J Fei², Y Yun³, J Wang², F Gu¹ and A D Ball¹
¹University of Huddersfield, UK
²Harbin Engineering University, China
³Qingdao Agricultural University, China

17.10 [136] Rotor dynamics in a pump system with magnetoelectrical, fluid and mechanical effects using ANSYS
Authors - W Tang¹,², F Gu², H Mao¹, A D Ball² and A Daraz²
¹Guangxi University, China
²University of Huddersfield, UK

17.30 [139] Application of minimum entropy deconvolution in diagnosis of reciprocating compressor faults based on airborne acoustic analysis
Authors - D Mondal, F Gu and A D Ball
University of Huddersfield, UK
Session 3B – CM of components in rotating machines
Chair: Dr J Liska  Room: The Buchannan

16.50  [134] Identification of seal dynamic force coefficients for turbine rotor monitoring purposes
Authors: K Kalista, J Liska, J Jakl and V Vasicek
University of West Bohemia, Czech Republic

17.10  [137] Monitoring and experimental validation of blade vibration forces acting on a rotor
Authors: V Vasicek, J Liska and J Jakl
University of West Bohemia, Czech Republic
Session 3C – **Ultrasonics NDT**  
*Chair: D Whittle  Room: The Great Western*

**16.50 [135] Flexible ultrasonic transducer development for couplant-free high-temperature monitoring**  
*Authors - D Irving, H Trodden and D Hughes  Novosound Ltd, UK*

**17.10 [138] Ultrasound and its applications**  
*Author - D Whittle  RMS Ltd, UK*
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<td>09.00</td>
<td>Plenary Keynote Lecture – Wider use of sensing capabilities in safety analysis to minimise dormant failures</td>
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<td></td>
<td>Author - M Türkaslan, Rolls-Royce Deutschland &amp; Co KG, Germany</td>
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<td>Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria</td>
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<td>09.30</td>
<td>Session 4A – Real-time health monitoring of machinery</td>
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<td>Chair: Dr S N Boychenko Room: The Victoria</td>
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<td>[202] Knowledge-based artificial intelligence based on the real-time diagnostic systems of equipment health monitoring</td>
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<tr>
<td></td>
<td>Authors - A Kostyukov and S N Boychenko</td>
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<td>SPC Dynamics, Russia</td>
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<td>09.50</td>
<td>[205] Data mining for real-time vibration analysis and machinery diagnostics</td>
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<tr>
<td></td>
<td>Authors - S N Boychenko and A V Kostyukov</td>
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<td>SPC Dynamics, Russia</td>
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<td>10.10</td>
<td>[208] Solving the problems of analysing the reliability of high-power steam turbine units in monitoring and diagnostic systems</td>
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<tr>
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<td>Authors - A I Kumenko¹, S V Medvedev¹ and S N Boychenko²</td>
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<td>¹MPEI National Research University, Russia</td>
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<td>²SPC Dynamics, Russia</td>
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<td>11.30</td>
<td>Session 4A continued – Modelling and testing of gearboxes</td>
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<td></td>
<td>[211] Nature of errors in machinery diagnostics</td>
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<tr>
<td></td>
<td>Authors - A Kostyukov, A Kostyukov and S N Boychenko</td>
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<td>SPC Dynamics, Russia</td>
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<td>11.50</td>
<td>[214] VM of gear units – status of ISO 20816-9 development</td>
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<td>Author - S Mills</td>
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<td>Spectrum CBM Ltd, UK</td>
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<td>12.10</td>
<td>[217] Quantity versus quality – the trade-off</td>
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<td>Author - D Manning-Ohren</td>
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<td>Eriks, UK</td>
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### Session 4B – Oil and debris monitoring

**Chair:** S Greenfield  
**Room:** The Buchannan

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<th>Time</th>
<th>Title</th>
<th>Author &amp; Affiliation</th>
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| 09.30 | **[203] An introduction to online oil debris monitoring technologies** | Author - S Greenfield  
Eaton Aerospace, UK                                          |
| 09.50 | **[206] Automated microscopical wear debris analysis**                | Author - T Nowell  
Intertek, Farnborough, UK                                      |
| 10.10 | **[209] Tribology and microscopy in the laboratory environment**       | Author - D Korachkin  
Swansea Tribology Services, UK                                  |

### Session 4B continued – Oil and debris monitoring/CM for marine

**Chair:** D C Shorten  
**Room:** The Buchannan

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<tr>
<th>Time</th>
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<th>Author &amp; Affiliation</th>
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| 11.30 | **[212] Predicting machine failures with greater confidence**         | Author - R Cutler  
Oil Analysis Laboratories, UK                                  |
| 11.50 | **[215] Oil analysis versus oil based condition monitoring – what to expect and, more importantly, what not to** | Author - D C Shorten  
Optimain Ltd, UK                                                  |
| 12.10 | **[218] The evolution of maintenance management optimisation within a modern shipping fleet with multiple vessel managers, both in-house and external** | Author - D C Shorten  
Optimain Ltd, UK                                                  |
Session 4C – Vibration analysis and diagnostics
Chair: Professor A Hope  Room: The Great Western

09.30  [204] Visualising vibration and using this as a diagnostic tool
Author - D Whittle
RMS Ltd, UK

09.50  [213] Limitation of vibration spectra
Author - S Mills
Spectrum CBM Ltd, UK

10.10  [210] Why has CM science and CBM delivery failed to achieve their full potential in the PPM delivery industry
Author - P Price
Monition, UK

Session 4C continued – Vibration analysis, diagnostics and prognostics: case studies from all industries
Chair: Professor A Hope  Room: The Great Western

11.30  [207] Update on ISO standards in CM and vibration
Author - S Mills
Spectrum CBM Ltd, UK

11.50  [216] Identifying infant mortality in a pump bearing after overhaul
Author - A McCann
AVT Reliability, UK

12.10  [219] Advanced diagnostics provide significant cost avoidances on problematic assets within a marine fleet
Author - A Barnes
VCI Consultancy, UK
### Session 5A – Modelling and testing of gearboxes

**Chair:** Professor F Pellicano  
**Room:** The Victoria

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<th>Time</th>
<th>Title</th>
<th>Author(s)</th>
<th>Institution(s)</th>
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</table>
| 15.00| **[222]** Experimental durability test for condition monitoring of carburised spur gears | G Iarricchio, A Zippo, M Barbieri and F Pellicano  
University of Modena and Reggio Emilia, Italy |                                                                                 |
| 15.20| **[228]** A numerical investigation into the behaviour of fatigue circumferential cracks in ultra-deep water pipelines | A Olamide  
University of Northampton, UK |                                                                                 |
| 15.40| **[231]** Localisation and mass estimation of loose parts in nuclear power plant using FEA-based big data | S Moon, S Han, T Kang and S Han  
Korea Atomic Energy Research Institute, Republic of Korea |                                                                                 |
Session 5B – Intelligent CM
Chair: Dr E K Juuso  Room: The Buchannan

15.00  [223] Integration of natural language in intelligent CM
Author - E K Juuso
University of Oulu, Finland

15.20  [226] Vibration condition monitoring by the higher-order spectral analysis
Author - L Gelman
University of Huddersfield, UK

15.40  [229] THIS SLOT IS AVAILABLE FOR A LATE SUBMISSION
Session 5C – CM by electrical analysis
Chair: G Walker  Room: The Great Western

15.00  [224] Integrating data from transformer CM to support asset management decisions
Authors - M Rowbottom1, J Beardsall1, R Heywood2, P Boreham2 and T McGrail3
1Drax Power, UK
2Doble PowerTest, UK
3Doble Engineering, USA

15.20  [227] AI approaches to interpretation of electrical CM data
Authors - I Mitiche1, A Nesbitt1, S Connor2, P Boreham2, J Slater1 and T McGrail3
1Glasgow Caledonian University, UK
2Doble PowerTest, UK
3Doble Engineering, USA

15.40  [233] How MBVI compares with MCSA
Author - G Walker
Faraday Predictive Ltd, UK
Session 6A – Modelling and testing of gearboxes
Chair: Professor F Pellicano  Room: The Victoria

16.45  [234] CM of Parkinson’s pathological tremors for functional electrical stimulation control
Authors - A Zippo1, F Pellicano1, G Iarriccio1, F Valzania2 and F Cavallieri3
1University of Modena and Reggio Emilia, Italy
2Arcispedale Santa Maria Nuova, Italy
3Sant’Agostino Estense Hospital, Italy
Session 6B – Intelligent CM
Chair: Dr E K Juuso  Room: The Buchannan

16.45  [232] Dynamic response of a metallic beam with different BCs in the presence of a crack discontinuity: A review
Authors - A Francese and M A Khan
Cranfield University, UK

17.05  [235] Extending the life of an evaporator vessel through testing, inspection, modelling and analysis
Authors - P A Liddicott, Z E Dennison Drake and K J Robinson
Sellafield Ltd, UK
Session 6C – Apprenticeship standards
Chair: S Mills  Room: The Great Western

16:45  [230] An introduction to the NDT apprenticeship standards
Author - S Cunningham
Skills Training UK
09.00  **Plenary Keynote Lecture –**

[301] Development of NDE techniques for the maintenance of long-span steel bridges based on infrared measurement

Author - Professor T Sakagami, Kobe University, Japan
Chair: D Gilbert, CEO BINDT, UK - Room: The Victoria

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**Session 7A – General CM**

Chair: **Professor S Noroozi**  Room: **The Victoria**

09.30  **[302] Invited overview presentation: Gearing up for machine health**

Author - A Starr
Cranfield University, UK

09.50  **[304] Energy harvester-powered CM in high dynamic range environments**

Author - A Wasenczuk
Perpetuum Ltd, UK

10.10  **[306] Invited overview presentation: Evolution of CM from machine dynamics to human dynamics**

Author - S Noroozi
Bournemouth University, UK

10.30  **[308] Application of IMUs in monitoring the positional accuracy during micro stepping processes**

Authors - K Abuowda and S Noroozi
Bournemouth University, UK

10.50  **[309] Mathematical modelling and sensor-based prediction and prognostic of thin coating failures**

Author - Z A Khan
Bournemouth University, UK
Session 7B – Failure analysis and diagnostics
Chair: Professor A Hope  Room: The Buchanan

09.30  [303] Liquefied petroleum gas plant maintenance: a case study of gangway failure analysis
Authors - E S Pereira, B M Alkali and O Niculita
Glasgow Caledonian University, UK

09.50  [305] Time series analysis of high energy density lithium-ion batteries for electric vehicle applications
Authors - H Almadni, B Alkali, G Lak and R Ansell
Glasgow Caledonian University, UK

10.10  [307] An introduction to JANUS: Monition’s cutting-edge Industry 4.0 diagnostic solution
Author - A Rähbarimanesh
Monition Ltd, UK
Session 8A – Room: The Victoria

11.15  Vibration analysis training workshop
   Author - D Whittle
   RMS Ltd, UK

12.15  Panel Session: Future directions in CM
   Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria
Session 8B – Room: The Buchanan

11.15 Lubrication analysis training workshop

Author - S Greenfield
Eaton Aerospace, UK
09.20 Plenary Keynote Lecture –


Author - Dr J Lacaille, Safran Aircraft Engines, France
Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria