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

Glasgow, United Kingdom
25-27 June 2019

09.20   **Plenary Keynote Lecture –**
[101] A novel automatic indexation process for identification of anomalous behaviours of turbofan engines

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

Session 1A – Trained structures and statistical methods in CM
Chair: **Professor L Kuravsky**   *Room:* **The Victoria**

11.00   **[102] How to reveal the influence of the human factor**

Authors - L S Kuravsky and G A Yuryev
         Moscow State University of Psychology and Education, Russia

11.20   **[105] Intelligence algorithms for intrusion and anomaly detection in virtual cloud networks, software and experiment design**

Author - G Yuryev
         Moscow State University of Psychology and Education, Russia

11.40   **[108] An intelligent system to support CM for activities of operators of complex technical systems**

Authors - L S Kuravsky and G A Yuryev
         Moscow State University of Psychology and Education, Russia

12.10   **[111] Application of a non-standard approach for diagnostic analysis of vibration waveforms**

Authors - F Y Balitsky[1,2] and A Sokolova[1]
         [1]Machinery Engineering Research Institute of the Russian Academy of Sciences, Russia
         [2]Spectrum Engineering, Russia

12.30   **[114] Integral evaluation of the dangerous behaviour probability for computer network users via parameters of their activity**

Authors - L S Kuravsky[1], G A Yuryev[1], M A Chervonenkis[2], A A Konstantinovsky[1], A A Shevchenko[1], S S Isakov[1] and D P Sincha[2]
         [1]Moscow State University of Psychology and Education, Russia
         [2]Pawlin Technologies Company, Russia

12.50   **[117] Bayesian evaluation to detect dangerous user behaviour in computer networks: an example of practical application**

Authors - A A Shevchenko[1], A A Konstantinovsky[1] and D P Sincha[2]
         [1]Moscow State University of Psychology and Education, Russia
         [2]Pawlin Technologies Company, Russia

13.10   **[120] A virtual adaptive simulator as a skill formation tool for the operators of complex technical systems**

Authors - S I Popkov
         Moscow State University of Psychology and Education, Russia

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 Esmaeili[1], L Wang[1], T J Harvey[1], N M White[1] and W Holweger[1,2]
[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 Els 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 Yu[1,2] and T R Lin[2]
[1]*Northeastern University, P R China*
[2]*Qingdao 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 Fu[1,2], Y Yang[2], Y Wang[2], F Gu[1] and A Ball[1]
[1]*University of Huddersfield, UK*
[2]*Northwestern 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 Sandoval[1,2], U Leturiondo[1], F Pozo[2], Y Vidal[2] and O Salgado[1]
[1]*IK4-Ikerlan Technology Research Centre, Spain*
[2]*Universitat 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

14.50 **Plenary Keynote Lecture –**
[220] An integrated approach to marine condition-based monitoring

Author - W Ross, Servowatch Systems, UK
Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria

Session 2A – Modelling and identification of blade-based rotor systems for CM
Chair: **Professor F Gu** *Room:* **The Victoria**

15.20 **[124] Monitoring of gear wear progressions based on a modulation signal bispectrum analysis of vibration**

Authors - X Sun[1,2], R Zhang[2], K Lu[2], A M Ahmaida[1], F Gu[1] and T Wang[2]
[1]University of Huddersfield, UK
[2]Taiyuan University of Technology, China

15.40 **[127] Time-varying coupled vibration analysis of a ball-screw feed system**

Authors - Q Wu[1,2], F Gu[2] and A D Ball[2]
[1]Lanzhou University of Technology, China
[2]University of Huddersfield, UK

16.00 **[130] A homography transformation-based video stabilisation method for structural health monitoring using an unmanned aerial vehicle**

Authors - M Li[1], F Gu[1], A D Ball[1] and L Song[2]
[1]University of Huddersfield, UK
[2]Chang'an University, China

Session 2B – CM of components in rotating machines
Chair: **Dr J Liska** *Room:* **The Buchannan**

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 Xu[1], J Fei[2], Y Yun[3], J Wang[2], F Gu[1] and A D Ball[1]
[1]University of Huddersfield, UK
[2]Harbin Engineering University, China
[3]Qingdao Agricultural University, China

17.10 **[136] Rotor dynamics in a pump system with magnetoelectrical, fluid and mechanical effects using ANSYS**

Authors - W Tang[1,2], F Gu[2], H Mao[1], A D Ball[2] and A Daraz[2]
[1]Guangxi University, China
[2]University 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
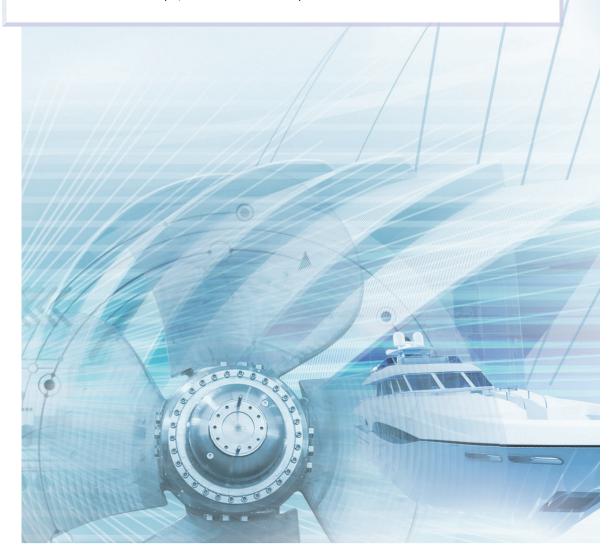
Session 3B – CM of components in rotating machines
Chair: **Dr J Liska** *Room:* **The Buchannan**

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

09.00 **Plenary Keynote Lecture –**
[201] Wider use of sensing capabilities in safety analysis to minimise dormant failures

Author - M Türkaslan, Rolls-Royce Deutschland & Co KG, Germany
Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria

Session 4A – Real-time health monitoring of machinery
Chair: **Dr S N Boychenko** *Room:* **The Victoria**

09.30 **[202] Knowledge-based artificial intelligence based on the real-time diagnostic systems of equipment health monitoring**

Authors - A Kostyukov and S N Boychenko
SPC Dynamics, Russia

09.50 **[205] Data mining for real-time vibration analysis and machinery diagnostics**

Authors - S N Boychenko and A V Kostyukov
SPC Dynamics, Russia

10.10 **[208] Solving the problems of analysing the reliability of high-power steam turbine units in monitoring and diagnostic systems**

Authors - A I Kumenko[1], S V Medvedev[1] and S N Boychenko[2]
[1]MPEI National Research University, Russia
[2]SPC Dynamics, Russia

Session 4A *continued* **– Modelling and testing of gearboxes**
Chair: **Dr S N Boychenko** *Room:* **The Victoria**

11.30 **[211] Nature of errors in machinery diagnostics**

Authors - A Kostyukov, A Kostyukov and S N Boychenko
SPC Dynamics, Russia

11.50 **[214] VM of gear units – status of ISO 20816-9 development**

Author - S Mills
Spectrum CBM Ltd, UK

12.10 **[217] Quantity** *versus* **quality – the trade-off**

Author - D Manning-Ohren
Eriks, UK

Session 4B – Oil and debris monitoring
Chair: **S Greenfield** *Room:* **The Buchannan**

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**

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

14.00 **Plenary Keynote Lecture –**
[123] Non-linear guided waves for the monitoring of incipient structural damage and material degradation

Author - Professor L Cheng, The Hong Kong Polytechnic University, China
Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria

14.30 **Plenary Keynote Lecture –**
[221] CM in present and prospective domestic heat and power generation systems

Author - Professor D Mikielewicz, Poland
Chair: Professor L Gelman, University of Huddersfield, UK - Room: The Victoria

Session 5A – Modelling and testing of gearboxes
Chair: **Professor F Pellicano** *Room:* **The Victoria**

15.00 **[222] Experimental durability test for condition monitoring of carburised spur gears**

Authors - G Iarriccio, 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**

Author - 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**

Authors - 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 Rowbottom[1], J Beardsall[1], R Heywood[2], P Boreham[2] and T McGrail[3]
[1]Drax Power, UK
[2]Doble PowerTest, UK
[3]Doble Engineering, USA

15.20 **[227] AI approaches to interpretation of electrical CM data**

Authors - I Mitiche[1], A Nesbitt[1], S Connor[2], P Boreham[2], J Slater[1] and T McGrail[3]
[1]Glasgow Caledonian University, UK
[2]Doble PowerTest, UK
[3]Doble 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 Zippo[1], F Pellicano[1], G Iarriccio[1], F Valzania[2] and F Cavallieri[3]
[1]University of Modena and Reggio Emilia, Italy
[2]Arcispedale Santa Maria Nuova, Italy
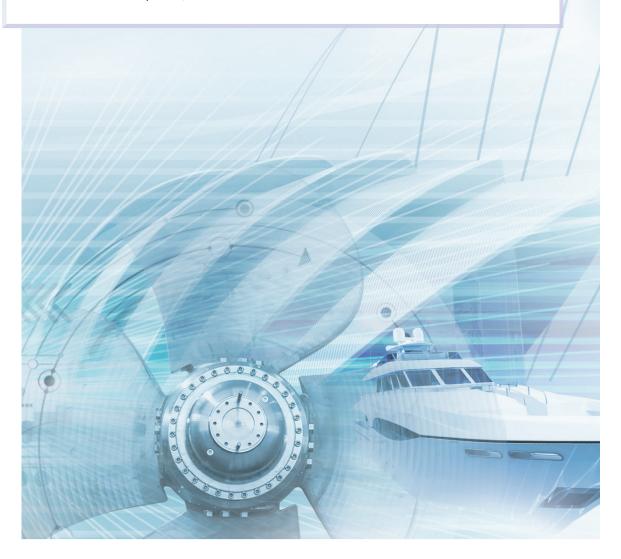*[3]Sant'Agostino Estense Hospital, Italy*

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

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 Buchannan**

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 Alkalli, 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 Rahbarimanesh
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 Buchannan**

11.15   Lubrication analysis training workshop

Author - S Greenfield
      Eaton Aerospace, UK

09.20 **Plenary Keynote Lecture –**
[101] A novel automatic indexation process for identification of anomalous behaviours of turbofan engines

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