12th International Conference on Condition Monitoring and Machinery Failure Prevention Technologies

(CM 2015/MFPT 2015)

Oxford, United Kingdom
9-11 June 2015

## Session IA – From wind turbine condition diagnosis to prognosis

**Chair:** Dr M Papaelias  
**Room A**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.20</td>
<td>[102] The value of prognostic condition monitoring for predictive wind turbine maintenance decisions</td>
<td>J Enrique, C Questa, A F Diez, V R Montejoano and F Polo Camacho Questa of Ingeteam Service</td>
<td>N/A</td>
</tr>
<tr>
<td>10.40</td>
<td>[106] Life estimation method for a wind turbine main shaft bearing</td>
<td>K A Karikari-Boateng, C Little and H Lee NAREC</td>
<td>N/A</td>
</tr>
</tbody>
</table>
| 11.00 | [110] Fault detection and diagnosis employing the electromagnetic sensor EMAT | C Q G Muñoz\(^1\), F P G Marquez\(^1\), A A Jimenez\(^1\), A A Jimenez\(^1\), L Cheng\(^2\), M Kogia\(^2\), A Mohimi\(^2\), M Papaelias\(^3\)  
\(^1\)Castilla-La Mancha University \(^2\)Brunel University \(^3\)University of Birmingham | N/A                                     |
| 11.30 | [114] Wavelet transmissibility analysis for wind turbine blade condition monitoring | L Zhang\(^1\), Z Lang\(^1\) and W-X Yang\(^2\)  
\(^1\)University of Sheffield \(^2\)Newcastle University | N/A                                     |
| 11.50 | [118] Multi-sensor acoustic emission and vibration signals data fusion for identifying axle bearing failures | E Giannouli, Z Huang, A Amini, P Vallely and M Papaelias  
The University of Birmingham | N/A                                     |
| 12.10 | [122] Fault detection and diagnosis, and optimal maintenance planning via FT and BDD | A P Marugán\(^1\), F P G Márquez\(^1\), R R H González-Carrato\(^2\)  
\(^1\)University of Castilla-La Mancha \(^2\)CUNEF-Ingenium | N/A                                     |
## Session 1B – Trained structures and statistical methods in condition monitoring

**Chair:** Prof L Kuravsky  **Room B**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.20</td>
<td><strong>[103] Monitoring of flight crew condition using oculomotor activity measurements</strong></td>
<td>Authors - L S Kuravsky¹, P A Marmalyuk², S N Baranov² and G A Yuryev¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Moscow State University of Psychology  ²Russian Aviation Co</td>
</tr>
<tr>
<td>10.40</td>
<td><strong>[107] On the question of symptom selection in diagnosing complex objects</strong></td>
<td>Authors - T Gałka  Institute of Power Engineering</td>
</tr>
<tr>
<td>11.00</td>
<td><strong>[111] Probabilistic modelling of CM operator activity on the base of the Rasch model</strong></td>
<td>Authors - L S Kuravsky, P A Marmalyuk, G A Yuryev, P N Dumin and A S Panfilova</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moscow State University of Psychology and Education</td>
</tr>
<tr>
<td>11.30</td>
<td><strong>[115] Dynamic stability of control rods in discrete nuclear power plant safety control systems</strong></td>
<td>Authors - V D Sizarev¹ and A I Menyailov²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Joint Stock Company N A Dollezhal Research and Development Institute of Power Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>²RANEPA</td>
</tr>
<tr>
<td>11.50</td>
<td><strong>[119] Probabilistic inspection of multimodally-distributed signals</strong></td>
<td>Authors - P Ettler¹, I Puchr¹, L Jirsa² and L Pavelkova²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹COMPUREG Plzen  ²Academy of Sciences of the Czech Republic</td>
</tr>
<tr>
<td>12.10</td>
<td><strong>[123] Embedded intelligence supporting intelligent asset management</strong></td>
<td>Authors - E Miguelaínez-Martin¹ and D Flynn²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Atkins – RAM  ²Heriot-Watt University</td>
</tr>
</tbody>
</table>
Session 1C – **Prognostics: case studies**

*Chair: Dr Z Skaf  Room C*

10.20  **[104]** Prognostics: design, implementation and challenges ..... 84
Author - Z Skaf  Cranfield University

10.40  **[108]** A degradation prognostics framework for gas turbine engines ..... 92
Authors - O Bektas and J A Jones  Warwick University

11.00  **[112]** Collection of a benchmark dataset for prognostic modelling ..... 102
Authors - O F Eker, F Khan, Z Skaf, F Camci and I Jennions
1 Cranfield University  2Antalya International University

11.30  **[116]** Simulations and measurements of dynamic response of paper machine roller ..... 112
Authors - M Mishra, J Odelius, M Rantatalo, R Johnsson, J-O Larsson,
M Bellander and I Niemi
1SKF-University Technology Centre, Luleå University of Technology
2Luleå University of Technology  3SKF Nordic Region
4BillerudKorsnäs, Karlsborgsverken

11.50  **[120]** Anomaly detection and fault identification in rotating machinery using machine learning ..... 119
Authors - S Lee and S Lee
1Doosan Heavy Industries & Construction
2Ulsan National Institute of Science and Technology

12.10  **[124]** Gearboxes prognostics with application to tidal turbines ..... 120
Author - F Elasha, J A Teixeira and D Mba
1Cranfield University  2London South Bank University
<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.20</td>
<td>The development of a guided ultrasonic wave prototype system for monitoring and protecting wind turbine blades in ice-forming environments</td>
<td>G R Edwards, TWI</td>
</tr>
<tr>
<td>10.40</td>
<td>De-icing of propeller blades: electro-thermal versus electro-mechanical techniques efficiency comparison</td>
<td>J Kanfoud, S Soua, T-H Gan, TWI</td>
</tr>
<tr>
<td>11.10</td>
<td>Remote condition monitoring of tidal turbine: a case study</td>
<td>A Romero¹, S Soua¹, B Wang², T-H Gan¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹TWI, ²Brunel University</td>
</tr>
<tr>
<td>11.30</td>
<td>New reliable technology for soil inspection using active vibration control in contaminated sites with drilling machinery condition monitoring</td>
<td>J Kanfoud, A Angulo, S Soua, Y Lage, T-H Gan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWI</td>
</tr>
<tr>
<td>11.50</td>
<td>Acoustic noise analysis for wind turbine machinery condition monitoring</td>
<td>J Kanfoud, A Romero, S Soua, T-H Gan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWI</td>
</tr>
<tr>
<td>12.10</td>
<td>Development of the fast three-dimensional ultrasonic testing system for the axial groove type steam turbine rotor</td>
<td>Y Suzuki¹, T Kudo², H Kamoshida²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Hitachi Ltd, ²Mitsubishi Hitachi Power Systems</td>
</tr>
</tbody>
</table>
13.30 Plenary Keynote Lecture - [126] Advances in rolling bearing current signature analysis ..... N/A
Author - Prof L Swedrowski, Poland  Chair - Prof L Gelman

Session 2A – OPTIMUS – From wind turbine condition diagnosis to prognosis  Chair: Dr M Papaelias  Room A

14.00 [127] Adequate settings of condition monitoring systems for different wind turbine types based on the lifecycle cost ..... 208
Authors - E S Asensio¹, J M P Pérez², F P G Márquez¹ and R Ruiz de la Hermosa González-Carrato²
¹University of Castilla-La Mancha  ²CUNEF-Ingenium

14.20 [131] Vibration-based tools for the optimisation of large-scale industrial wind turbine devices ..... 220
Authors - R Ruiz de la Hermosa González-Carrato¹, G Márquez², F Pedro² and M Papaelias³
¹Colegio Universitario de Estudios Financieros, Serrano Anguita
²Ingenium Research Group  ³University of Birmingham

14.40 [135] Integrated condition monitoring of industrial wind turbines – the OPTIMUS project ..... 230
Authors - S Hajiabady¹, E J Camacho Questa², F Polo², V R Montejano², M Murillo³, C Roldan³, F P G Marquez⁴, S Hillmansen¹, P Tricoli¹ and M Papaelias¹
¹The University of Birmingham  ²Ingeteam Service
³Indra Sistemas  ⁴Universidad de Castilla-La Mancha
Session 2B – **Real-time health monitoring of machinery**

Chair: **Prof V Kostyukov** 2B – St Johns Room

**14.00 [128] Real-time vibration-diagnostic condition monitoring of production and transport complex machinery ..... 231**

Authors - V N Kostyukov¹,² and E V Tarasov²

¹SPC Dynamics ²Omsk State Technical University

**14.20 [132] Risk assessment selection of guideline values of diagnostic signs ..... 241**

Authors - V N Kostyukov and A P Naumenko  SPC Dynamics

**14.40 [136] Diagnostics of rolling bearings by the parameters of the characteristic function ..... 246**

Authors - V N Kostyukov, A P Naumenko, S N Boichenko and I S Kudryavtceva

SPC Dynamics
Session 2C – **Vibration condition monitoring**  
*Chair: Dr S Ganeriwala  2C – Charlbury Room*

14.00  **[129] Title to be confirmed** ..... N/A  
*Author - S Ganeriwala  SpectraQuest*

14.20  **[133] Title to be confirmed** ..... N/A  
*Author - S Ganeriwala  SpectraQuest*

14.40  **[137] Compensating an assembly fault in a gas turbine rotor by in-situ balancing: a case study** ..... 250  
*Authors - A Masoumi¹, M Karimi² and H Ahmadi³*

¹Kerman Power Generation Management Co, Iran  
²School of Mechanical and Manufacturing Engineering, Australia  
³MAPNA Turbine Engineering & Manufacturing Co
### Session 2D – **Acoustic condition monitoring**

*Chair: Dr I Petrunin  2D – Wolvercote Room*

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00</td>
<td>[130] Relationship between 3D tool geometry, in-process acoustic</td>
<td>N Ray¹, E J Cross¹, K Worden¹, T McLeay², S Turner² and J-P Villain-Chastre³</td>
<td>¹The University of Sheffield  ²AMRC with Boeing ³Messier-Bugatti-Dowty</td>
</tr>
<tr>
<td></td>
<td>emissions and workpiece surface integrity in finish end milling</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>acoustic emission technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.40</td>
<td>[138] Improvement of axle bearing monitoring systems through the</td>
<td>Z Zhang, E Stewart, M Entezami and C Roberts</td>
<td>The University of Birmingham</td>
</tr>
<tr>
<td></td>
<td>use of high-speed imaging for directing acoustic beamforming</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Session 3A – Condition monitoring of turbomachinery

**Chair:** Dr S Muthuraman  
**Room:** Magdalen Room

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.30</td>
<td>[139] Low-pressure steam turbine last stage blade vibration monitoring</td>
<td>S Muthuraman, J Twiddle, L Varley, J Rongong and N Noor</td>
</tr>
<tr>
<td>15.50</td>
<td>[143] Generator rotor thermal sensitivity</td>
<td>S Muthuraman, B Staneff, M Singh, A Patel and J Twiddle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cranfield University</td>
</tr>
<tr>
<td>16.10</td>
<td>[147] Gas turbine combustion dynamics monitoring</td>
<td>S Muthuraman and G Newcombe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cranfield University</td>
</tr>
</tbody>
</table>
15.30  [140] The technology of complex assessment of EMU trains in depot ..... 296
Authors - A V Kostyukov, D V Kazarin and A A Serov  SPC Dynamics

15.50  [144] A unit for experimental investigations of vibration of rolling stock assemblies in operation ..... 303
Authors - A V Kostyukov, D V Kazarin and A E Tsurpal  SPC Dynamics

16.10  [148] A fatigue life assessment methodology for rolling element bearing under irregular loading ..... 312
Authors - G Jombo¹, P Pilidis¹, S Sampath¹ and David Mba²
¹Cranfield University (UK)
²London South Bank University
Session 3C – Signal processing for condition monitoring
Chair: Dr G Zusman  3C – Charlbury Room

15.30  [141] Wavelet – Fourier transforms for an industrial robot fault detection ..... 324
Authors - A A Jaber1,2 and R Bicker1
1Newcastle University, Newcastle upon Tyne
2University of Technology, Baghdad

15.50  [145] Automated cepstral editing procedure (ACEP) for removing discrete components from vibration signals ..... 336
Authors - A P Ompusunggu and T A Bartic
Flanders Make vzw

16.10  [149]
FREE SLOT AVAILABLE FOR A LATE SUBMISSION ..... N/A
Session 3D – Signal processing and modelling for condition monitoring
Chair: Dr L Zanotti-Fragonara 3D – Wolvercote Room

15.30 [142] Discretisations impact on amplitude accuracy for computer analysis ..... 348
Author - T Lago
Tech Fuzion, Qirra Sound Technologies Europe AB

15.50 [146] Dynamic modelling of complex engineering assets using associative memory models ..... 349
Authors - T Jackson and J Austin
Cybula

16.10 [150]
FREE SLOT AVAILABLE FOR A LATE SUBMISSION ..... N/A
### Session 4A – KAStrion project: condition monitoring of wind turbines

**Chair: Dr N Martin  4A – Magdalen Room**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
</table>
| 10.00  | Keynote – KAStrion project: a new concept for the condition monitoring of wind turbines | N Martin  
University of Grenoble Alpes, GIPSA-Lab, France                                           |
| 10.20  | Endurance testing on a wind turbine test-bench: a focus on slow rotating bearing monitoring | N Bédouin and S Sieg-Zieba  
CETIM                                                                                         |
| 10.50  | AStrion data validation of non-stationary wind turbine signals       | G Song, Z-Y Li, P Bellemain, N Martin and C Mailhes  
1 University of Grenoble Alpes, GIPSA-Lab, France  
2 IRIT-TESA, INP-ENSEEIHT                                                              |
| 11.55  | AStrion strategy: from acquisition to diagnosis. Application to wind turbine monitoring | T Gerber, M Firla, Z-Y Li, P Bellemain and C Mailhes  
1 University of Grenoble Alpes, GIPSA-Lab, France  
2 IRIT-TESA, INP-ENSEEIHT                                                              |
| 12.15  | Online condition monitoring of wind turbines through three-phase electrical signature analysis | G Cablea, P Granjon, C Berenguer and P Bellemain  
University of Grenoble Alpes, GIPSA-Lab, France                                             |
| 12.35  | Machinery in highly changing operations: on designation of operational states | M Strączkiewicz, P Wiciak, A Jabłoński and T Barszcz  
AGH University of Science and Technology                                                      |
<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
<th>Authors</th>
</tr>
</thead>
</table>
| 10.00 | **[204] Estimation of the spall size in a rolling element bearing** .......... 421 | Authors - G Kogan¹, J Bortman¹ and R Klein²  
¹University of the Negev  ²R K Diagnostics |
| 10.20 | **[208] Identification of the fitting degree of selected vibration parameters of hydraulic dampers for the condition diagnosis** .......... 429 | Authors - M P Hetmanczyk  The Silesian University of Technology |
| 10.50 | **[212] Improved bearing sensing for prognostics: from vibrations to optical fibres** .......... 430 | Authors - M Khmelnitsky¹, U Ben-Simon², R Klein³, M Tur⁴ and J Bortman¹  
¹University of the Negev  ²Israel Aerospace Industries  ³RK Diagnostics  ⁴Tel Aviv University |
| 11.55 | **[216] NMF-based decomposition for anomaly detection applied to vibration analysis** .......... 441 | Authors - M Abdel-Sayed¹,², ⁴, D Duclos¹, G Fay², J Lacaille³ and M Mougeot⁴  
¹SAFRAN TECH (Safran Group)  ²CentraleSupélec – MAS  ³Snecma (Safran Group)  ⁴Université Paris Diderot – LPMA |
| 12.15 | **[220] On characterisation and detection of rolling contact fatigue (RCF) defects in railway wheels using an alternating current field measurement sensor (ACFM)** .......... 455 | Author - A Juna  BINDT |
| 12.35 | **[224] FREE SLOT AVAILABLE FOR A LATE SUBMISSION** .......... N/A |
**Session 4C – Experimental and simulation models for monitoring and diagnostics**

*Chair: Prof A Lucifredi  4C – Charlbury Room*

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00</td>
<td>Dynamic analysis (ADAMS/Rail) of the rail-wheel contact during train switch crossing</td>
<td>A Lucifredi, P Silvestri, V Canevari and S Rubino  University of Genova</td>
<td>4C – Charlbury Room</td>
</tr>
<tr>
<td>10.20</td>
<td>Improvement of railway performance: a study of Swedish railway infrastructure</td>
<td>Y K Al-Douri, R Karim and P Tretten  Luleå University of Technology</td>
<td></td>
</tr>
<tr>
<td>10.50</td>
<td>Kinematic and structural proposal and study of a new mechanism for the stabilisation of yachts at anchor by flying fins</td>
<td>A Di Terlizzi, A Lucifredi, P Silvestri, A Canepa, J E Guerrero and A Bottaro  University of Genova</td>
<td></td>
</tr>
<tr>
<td>11.55</td>
<td>Structural redesign and dynamic analysis for lifting machine requalification and life evaluation. Case study: tower crane Liebherr 32 TT</td>
<td>A Lucifredi¹, P Giribone¹, P Silvestri¹, R Ravalli² and P Magliano² ¹University of Genova ²CSS Engineering – Crane, Safety and Security Engineering</td>
<td></td>
</tr>
<tr>
<td>12.15</td>
<td>A virtual sensor to identify low-level conditions of oil in an electro-hydraulic actuation system for robotised gearboxes</td>
<td>A Lucifredi¹, G Medico², P Silvestri¹ and A Assenzio¹ ¹University of Genova ²Magneti Marelli Powertrain</td>
<td></td>
</tr>
<tr>
<td>11.55</td>
<td>Monitoring of steam turbine blade state from the relative rotor</td>
<td>J Liska, J Jakl and J Strnad  University of West Bohemia</td>
<td></td>
</tr>
</tbody>
</table>
### Session 4D – Non-destructive testing

*Chair: Dr K Newton  4D – Wolvercote Room*

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00</td>
<td>[206] The UK Research Centre in NDE: an overview</td>
<td>K Newton  RCNDE  Imperial College</td>
</tr>
<tr>
<td>10.20</td>
<td>[210] Monitoring damage in power plant components at 565°C</td>
<td>C Brett  E.ON</td>
</tr>
<tr>
<td>10.50</td>
<td>[214] Robotic inspection of complex-geometry components</td>
<td>I Cooper  TWI</td>
</tr>
<tr>
<td>12.15</td>
<td>[222] An investigation into the eigen-nature of hybrid composite structures</td>
<td>S M Ghoneam and A A El-Hamid Hamada  Menoufia University, Egypt</td>
</tr>
<tr>
<td>12.35</td>
<td>[226] Novel front-end ultrasonic transducer wheel probe for automated NDT</td>
<td>A Gillies  University of Strathclyde</td>
</tr>
</tbody>
</table>
Session 5A – **General condition monitoring**

Chair: **Prof L Swedrowski**  
5A – **Magdalen Room**

15.10  **[228] Educational platforms for NDT and condition monitorings** ..... N/A  
**Author - T Lago Tech Fuzion Qirra Sound Technologies Europe AB**

15.30  **[232] Dimensional analysis for the design of a scaled test-bench.**  
**Case study: elevators** ..... 524  
**Authors - E Esteban¹, O Salgado¹, A Iturrospe² and I Isasa³**  
¹IK4-IKERLAN  
²Mondragon Unibertsitatea  
³Orona EIC S Coop

15.50  **[236]**  
**FREE SLOT AVAILABLE FOR A LATE SUBMISSION** ..... N/A
Session 5B – Vibration condition monitoring

Chair: Dr I Petrunin  5B – St Johns Room

15.10  [229] Envelope preprocessing techniques for rolling element bearing diagnosis in variable speed conditions ..... 536

Authors - D Abboud¹,², J Antoni¹, M Eltabach² and S Sieg-Zieba²

¹University of Lyon  ²CETIM

15.30  [233] Reciprocating machinery condition monitoring based on matching (optimal) vibration signal filtration ..... 548

Author - G Zusman

Vibration Measurement Solutions Inc

15.50  [237] Stochastic modelling of vibration signal in application to diagnostics of bearings in time varying conditions ..... 559

Authors - A Wyłomańska¹, R Zimroz¹,², J Janczura¹, J Obuchowski¹ and G Żak¹

¹Wroclaw University of Technology  ²KGHM CUPRUM Ltd
Session 5C – Advanced signal processing and diagnostics in condition monitoring
  Chair: Dr E Juuso  5C – Charlbury Room

15.10  [230] Recursive data analysis and modelling in prognostics ..... 560
  Author -  E Juuso  University of Oulu

15.30  [234] Epicyclic gearbox monitoring in a hydroelectric power plant with varying load ..... 568
  Authors -  R P Nikula, K Leiviskä and K Karioja
  University of Oulu

15.50  [238] Monitoring of a rod mill using advanced feature extraction methods ..... 580
  Authors -  J Laurila, A Koistinen, E Juuso and T Liedes
  University of Oulu
Session 5D – Applications
Chair: TBC  5D – Wolvercote Room

15.10  [231] Pulsation condition in two-phase flow ..... 591
      Author - S Ahmadi  Udine University

15.30  [235] Do you really know what is going on inside your equipment?
    Making use of torsional signals using the motor as a sensor ..... 592
    Authors - G Walker  Artesis LLP

15.50  [239]
    FREE SLOT AVAILABLE FOR A LATE SUBMISSION ..... N/A
Session 6A – CM techniques
Chair: Prof J Bortman
6A – Magdalen Room

Author - M P Srivastava IRD Mechanalysis Ltd

17.00 [243] Condition monitoring – management tools ..... 615
Author - R Bottomley Lloyd’s Register

17.20 [246] A data fusion algorithm for the estimation of health index value of the integrated drive generator ..... 616
Authors - P V R Sai Kiran, J Rao, V Domse, S K MallikarjunaSwamy and V Upendranath CSIR-National Aerospace Laboratories
Session 6B – **Fault diagnostics of rotating machinery**  
*Chair: Dr O Cardona-Morales  6B – St Johns Room*

16.40  [241] Real-time adaptation of spectral kurtosis to time-varying load conditions ..... 617  
Author - J Obuchowski\(^1\), R Zimroz\(^1,2\) and A Wyłomańska\(^1\)  
\(^1\)University of Technology, Poland  \(^2\)KGHM CUPRUM Ltd

17.00  [244] Single-channel source separation using EEMD and bounded component analysis in rotating machines ..... 618  
Authors - E F Sierra-Alonso\(^1\), O Cardona-Morales\(^1,2\), C A Aguirre-Echeverry\(^1\) and G Castellanos-Dominguez\(^1\)  
\(^1\)Universidad Nacional de Colombia  \(^2\)Universidad Catolica de Manizales

17.20  [247] Infrared image segmentation for fault diagnosis of rotating machinery ..... 627  
Authors - O Cardona-Morales\(^1\), H A Fandiño-Toro\(^2\), H D Benitez-Restrepo\(^3\) and G Castellanos-Dominguez\(^1\)  
\(^1\)Universidad Nacional de Colombia  
\(^2\)Instituto Tecnologico Metropolitano  \(^3\)Pontificia Universidad Javeriana
Session 6C – **Advanced signal processing and diagnostics in condition monitoring**
Chair: **Dr E Juuso** 6C – **Charlbury Room**

16.40  
Author - K Karioja and E Juuso  University of Oulu

17.00  
[245] Materials monitoring and evaluation using thermal NDT ..... N/A
Author - N Avdelidis  University Laval, Canada

17.20  
[248] Development of a novel condition monitoring tool for linear actuators ..... 644
Authors - C Ruiz-Cárce1 and A Starr  Cranfield University

17.20  
**Plenary Keynote Lecture for the conference**
[301] Mathematical modelling of mechanical systems ..... N/A
Author - Prof G Singh (India)  Chair: Prof L Gelman
09.00  **Plenary Keynote Lecture - [249] Title to be confirmed ..... N/A**
   *Author - Prof I Gray CBE, UK   Chair - Prof L Gelman*

Session 7A – **Advanced signal processing for MCM and NDT**
   *Chair: Prof R Smid  7A – Magdalen Room*

09.30  **[302] Ontology-based automated design of FDD systems ..... 656**
   *Authors - R Smid, V Horyna and O Hanuš  
Czech Technical University in Prague*

09.50  **[305] Virtual sensor of mass flow for diagnosis of HVAC unit ..... 660**
   *Authors - O Hanuš and V Horyna  
Czech Technical University in Prague*

10.10  **[308] FREE SLOT AVAILABLE FOR A LATE SUBMISSION ..... N/A**
Session 7B – Signal processing and modelling for condition monitoring
Chair: Prof L Gelman  7B – St Johns Room

09.30  [303] Novel vibration diagnosis of rolling bearings ..... N/A
Authors -  L Gelman and T Patel  Cranfield University

09.50  [306] Novel vibration diagnostics of rumble gas turbines ..... N/A
Authors -  L Gelman¹, I Petrunin¹, M Walters² and C Parrish²
¹Cranfield University  ²Rolls-Royce

10.10  [309] Modelling for NDT in civil engineering ..... N/A
Authors - L Gelman and L Fragonara  Cranfield University
**Session 7C – Vibration analysis for condition monitoring**

*Chair: Prof T Hope  7C – Wolvercote Room*

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.30</td>
<td>Vibration analysis of complex gearboxes and wind turbines</td>
<td>D Whittle  RMS Ltd</td>
<td>666</td>
</tr>
<tr>
<td>09.50</td>
<td>An update on the CM ISO standards</td>
<td>S Mills  SpectrumCBM Ltd</td>
<td>N/A</td>
</tr>
<tr>
<td>10.10</td>
<td>Motor dynamic analysis</td>
<td>D Kouadria  SKF Ltd</td>
<td>667</td>
</tr>
</tbody>
</table>
Session 8A – Acoustic emission for condition monitoring
Chair: Mr R Reuben  8A – Magdalen Room

11.00  [311] The condition monitoring toolbox and AE applications within the steel industry ..... N/A
Author - I Taylor  Misras Group Ltd

11.20  [314] Title to be confirmed ..... N/A
Authors - To be confirmed  AE Working Group
Session 8B – Wear debris analysis for condition monitoring
Chair: TBC  8B – St Johns Room

11.30  [312] Oil condition monitoring in marine two-stroke diesel engines ..... 668
Author - D Blazina  Shell

11.20  [315] Automated wear debris analysis ..... 677
Author - T Nowell  Intertek Farnborough
Session 8C – **General condition monitoring**
*Chair: Prof T Hope  8C – Wolvercote Room*

11.00  [313] **Safe thermal severity extrapolation of low-energy circuits** ..... N/A
   *Author - D Manning-Ohren  ERIKS UK*

11.50  [316] **Inelasticity monitoring of structural materials at fatigue** ..... 678
   *Author - G Pisarenko and A Mailo
   National Academy of Sciences of Ukraine*
Energy conservation by addressing resonance of VFD driven condensate extraction pump at DTPS ..... 679

Authors - H M Bari, A A Deshpande and S S Patil
Department of Maintenance Planning, Condition Monitoring Cell, Reliance Energy, Mumbai, INDIA.

This paper shares a success story out of the Implementation of CM techniques at DTPS, wherein imminent Resonance problem of VFD driven 650 Kw HT auxiliary Condensate Extraction Pump – 2B was diagnosed. In 2007, VFD was retrofitted for reducing pump speed in order to achieve energy conservation. Reducing pump speed with control valve full open condition after VFD installation achieves Deaerator level control as well as reduction in power consumption. On 17/07/2014, Pump Mechanical seal replaced to attend leakage & pump again put back in service. On 22.07.2014, it was observed that only Motor DE bearing vertical vibrations deviated from 0.6 to 3.1 mm/sec (RMS) between speed ranges of 1310 to 1335 rpm in VFD mode. From vibration spectrum analysis, suspected Electrical or Mechanical resonance problem. VFD -THD measurement carried out but all readings found within limits which eliminated possibility of electrical resonance. To pinpoint mechanical resonance, Bump test carried out. It showed natural frequency of system 1320 rpm which is very close to operating speed of Pump in VFD mode.

After studying all data, it was noticed that vibration of Motor increased only after Mechanical seal replacement. Hence, concluded that rise of vibration might be happening due to disturbance in contact area of new seal w.r.t. old seal which changed the stiffness of Pump & ultimately shift of natural frequency near to operating speed creating resonance in Pump, resulting in high vibration. By observing increasing vibration trend, decided to changeover pump. During maintenance, pump seal removed. Cleaning, Inspection & Mechanical seal re-fitting done. The catastrophic failure of Motor & Pump is 2 avoided, thus prevented downtime & achieved desired energy conservation. The importance of Vibration & Bump test measurement helped in diagnosing the exact root cause of abnormality well in advance which could have caused total cost of £3,129.

A self-organising communication system of a sensors network, based on the swarm algorithm ..... 690

Author - Krzysztof Stankiewicz Institute of Mining Technology, Poland

An idea of a self-organising system to transfer of measuring data, based on swarm algorithm, with a special attention to the new approach to the routing of a data packet in communication networks of the mesh structure, has been presented. The system is designed mainly to be used in mine sensory networks of a static or slow-changing structure. An impact of the subject system on effectiveness of a communication network has been presented as well as an increase of the functional safety of the machines and equipment, in which similar multi-redundant solutions of transfer of measuring data are used, has been indicated.