SURFACE ENGINEERING IN AUTOMOTIVE AND AEROSPACE INDUSTRIES

Institution of MECHANICAL ENGINEERS

9 June 2015
University of Leeds
www.imeche.org/events/S6222

Tribology Group
Seminar, poster sessions and PVD lab tour

SURFACE ENGINEERING IN AUTOMOTIVE AND AEROSPACE INDUSTRIES

9 June 2015, University of Leeds

FIND OUT HOW VITAL RESEARCH INTO SURFACE ENGINEERING FOR THE AUTOMOTIVE AND AEROSPACE INDUSTRIES CAN PROVIDE ENVIRONMENTAL SUSTAINABILITY AND A REDUCTION IN LIFE-CYCLE COSTS.

Academic experts and leading OEMs from engine manufacturers in both the aerospace and automotive industries will come together to showcase early research and development in surface engineering, as well as those from the materials and coatings industry.

Cutting-edge coating and surface treatment technologies are increasing in importance for both automotive and aerospace industries. New coating compositions, formulations or pre-treatments for coatings that span the full range of compositions and deposition methods are essential to increase environmental sustainability of engines. This seminar will provide transferable lessons across a number of industries to increase awareness of surface engineering.

BENEFITS OF ATTENDANCE:

- **Analyse** how surface engineering of turbomachinery components will meet future industry trends with **Dr Michael Burkinshaw**
- **Understand** how to reduce environmentally hazardous substances in surface treatments with **Prof Suman Shrestha**
- **Learn** about future trends in boundary lubrication of carbon-based coatings with **Dr Maria-Isabel De Barros Bouchet**
- **Look** at the prospects of driving costs down and increasing equipment capacity with **IHI Hauzer Techno Coating**

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PROGRAMME

TUESDAY 9 JUNE 2015

09:00 **REGISTRATION AND NETWORKING REFRESHMENTS**

09:30 **CHAIR'S WELCOME**
Dr Ardian Morina, Deputy Director of Research and Innovation, Senior Lecturer, School of Mechanical Engineering, University of Leeds

09:40 **SURFACE ENGINEERING OF TURBOMACHINERY COMPONENTS TO MEET FUTURE INDUSTRY TRENDS**
Dr Michael Burkinshaw, Senior Tribologist, Cummins Turbo Technologies
- Detailed overview of a turbocharger and its components
- Discussing the drivers behind surface engineering of turbocharger components
- Examining specific applications of surface treatments applied to turbocharger components

10:05 **Q&A SESSION**

10:10 **LUBRICANT FORMULATION FOR ADVANCED COATINGS IN HIGH-PERFORMANCE ENGINES**
Dr Andrew Greenall, Project Leader, Shell Motorsport Lubricant Development
- An overview of the use of advanced coatings in high-performance engines, and how we can formulate the lubricant to take advantage of their beneficial properties
- A focus on DLC coatings and their chemical interactions with lubricants, and how viscosity plays an important role
- Learnings from motorsports and how these are applied to commercial applications

10:35 **Q&A SESSION**

10:40 **FUTURE TRENDS IN BOUNDARY LUBRICATION OF CARBON-BASED COATINGS FOR THE AUTOMOTIVE INDUSTRY**
Dr Maria-Isabel De Barros Bouchet, Associate Professor, Laboratory of Tribology and System Dynamics, Ecole Centrale de Lyon
- Carbon-based coatings for the automotive industry
- Performances of carbon-based coatings under boundary lubrication conditions
- Hybridisation changes induced by friction in carbon-based coatings

11:05 **Q&A SESSION**

11:10 **NETWORKING REFRESHMENT BREAK AND POSTER SESSION**

11:40 **PLASMA ELECTROLYTIC OXIDATION (PEO) – REACH-COMPLIANT ADVANCED SURFACE TECHNOLOGY**
Prof Suman Shrestha, Vice President – Applications Development and Quality Systems, Keronite International
- Analysing plasma electrolytic oxidation process for surface treatment of light metals (eg Al, Mg, Ti and their alloys including MMCs) and microstructure relationships
- Reducing environmentally hazardous substances in surface treatments
- Increasing protection to the base alloy in terms of corrosion, wear and improving other functional characteristics (thermo-optical, dielectric, thermal barrier, low friction coefficient)

12:05 **Q&A SESSION**

12:10 **HIGH-TEMPERATURE OXIDATION AND WEAR MECHANISMS FOR TiAlN BASED HARD COATINGS**
Vishal Khetan, Marie Curie Research Fellow, School of Mechanical Engineering, University of Leeds
- Potential of TiAlN as high-temperature protective coatings
- Understanding of the oxidation and wear mechanisms (700 to 950°C) for TiAlN based coatings
- Development of R&D methodology for high-temperature tribological evaluation of TiAlN based hard coatings

12:35 **Q&A SESSION**

12:40 **NETWORKING LUNCH, POSTER SESSION AND OPTIONAL PVD LAB TOUR**
(Please highlight if you would like to attend this tour on the booking form)

14:00	**HIGH-VOLUME COATING TECHNOLOGIES FOR APPLICATIONS IN THE AUTOMOTIVE INDUSTRIES** **Dave Doerwald, Manager Process Engineering, Ruud Jacobs, Process Manager Tribological Coatings, Geert-Jan Franssen, Product Manager Tribological Coatings, Ivan Kolev, Senior Process Engineer, IHI Hauzer Techno Coating BV** • Examining technological developments in surface engineering over the last five years • Analysing technology development drivers such as reduction of CO_2 emissions • Cost as a technology driver: increasing equipment capacity
14:25	**Q&A SESSION**
14:30	**APPLICATIONS FOR COLD SPRAY FORMING AND COATING TECHNOLOGIES IN THE AEROSPACE AND AUTOMOTIVE INDUSTRIES** **Heidi Lovelock, Manager - Surface Engineering, TWI Ltd** • Introduction to the cold spray process • Repair of Mg and Al alloy components • Deposition of Ti and Ni based alloys • Facilitating the joining of aluminium alloys
14:55	**Q&A SESSION**
15:00	**NETWORKING REFRESHMENT BREAK AND POSTER SESSION**
15:30	**TRIBOLOGICAL CHALLENGES POSED BY THE REACH LEGISLATION TO FUEL CONTROLS SYSTEM DESIGN** **Terry Hirst, Materials Technology Manager Commodity Strategy, Controls and Data Services, Part of the Rolls-Royce Group**
15:55	**Q&A SESSION**
16:00	**ENERGY-EFFICIENCY IN AUTOMOTIVE AND AEROSPACE APPLICATIONS BY SURFACE TECHNOLOGY** **Dr. Nazlim Bagcivan, Director R&D Surface Technology, Schaeffler** • Overview about Schaeffler coatings for various applications • Energy-efficient coatings in automotive drivetrain • Application of thin film coatings in aerospace applications
16:25	**Q&A SESSION**
16:30	**LATEST ADVANCES IN SURFACE TECHNOLOGY FOR AUTOMOTIVE AND AEROSPACE INDUSTRIES** **Dr Liuquan Yang, R&D Engineer/Marie Curie Fellow, Oerlikon Sorevi** **Toby Middlemiss, Segment Manager Aerospace, Oerlikon Balzers** • Analysing current market trends and industry challenges • Developing coatings for automotive and aerospace industries • Evaluating coating applications for automotive, aerospace and precision components
16:55	**Q&A SESSION**
17:00	**THE INFLUENCE OF COATING PARAMETERS ON TRIBOLOGICAL PERFORMANCE AND TRIBOFILM FORMATION** **Dr Hongyuan Zhao, Dr Ardian Morina, School of Mechanical Engineering, University of Leeds** • DLC Coatings can have different mechanical properties when coating parameters are changed • The tribological performance is also influenced • Effects on tribochemistry of carbon films
17:25	**Q&A SESSION**
17:30	**CHAIR'S CLOSING COMMENTS**
17:40	**END OF SEMINAR**

Find out more about our speakers at www.imeche.org/events/S6222
- This programme is subject to change.
- The Institution is not responsible for the views or opinions expressed by individual speakers.

Organising committee:
- Dr Ardian Morina, Deputy Director of Research and Innovation, Senior Lecturer, School of Mechanical Engineering, University of Leeds
- Dr Michael Burkinshaw, Senior Tribologist, Cummins Turbo Technologies

SPEAKERS AND CONTRIBUTORS

DR ARDIAN MORINA

DEPUTY DIRECTOR OF RESEARCH AND INNOVATION & SENIOR LECTURER, SCHOOL OF MECHANICAL ENGINEERING, UNIVERSITY OF LEEDS

Dr Ardian Morina's research work is focused on the interdisciplinary research fields of tribology and surface engineering. The main objective of his research is the development of mechanistic and numerical models that describe friction and wear performance in boundary and mixed lubrication regime. This research is of relevance to automotive, manufacturing and energy industries and is supported by EPSRC, EU and industry project grants. His key research areas include engine tribology and tribochemistry, transmission systems tribology and tribochemistry, novel experimental and analytical techniques for tribology/ tribochemistry research, friction and wear of novel materials and interface processes.

DR MICHAEL BURKINSHAW

SENIOR TRIBOLOGIST, CUMMINS TURBO TECHNOLOGIES

Dr Michael Burkinshaw is Senior Tribologist at Cummins Turbo Technologies, where he is responsible for research and development conducted in the topic areas of tribology and surface engineering. He and his team are currently focusing their work on developing innovative solutions to meet future engineering challenges within the turbomachinery industry, specifically materials and surface treatments to improve product durability, optimise frictional response and minimise product cost.

DR MARIA-ISABEL DE BARROS BOUCHET

ASSOCIATE PROFESSOR, DEPARTMENT OF SCIENCE AND TECHNOLOGY OF MATERIALS AND SURFACES, ECOLE CENTRALE DE LYON

Dr Maria-Isabel De Barros Bouchet's research activity in the Laboratory of Tribology and System Dynamics mainly concerns the understanding of tribochemical reactions of lubrication additives using simulation by gas phase lubrication, especially the lubrication of carbon-based coatings with green additives and super-lubricity mechanisms. She has over 50 publications with numerous citations on these topics and has collaborated to the redaction of three books. Her work is at the origin of various patents on those topics and the subject of numerous international invited talks.

PROF SUMAN SHRESTHA

VICE PRESIDENT – APPLICATIONS ENGINEERING, KERONITE INTERNATIONAL

Prof Suman Shrestha spent five years at TWI helping aerospace and oil & gas industries working on a wide variety of surface technologies. In 2005 he joined Keronite to focus on research, application development and commercial exploitation of the PEO technology on light alloys (Al, Mg, Ti). Currently, he has been working with major aerospace companies including Airbus, Boeing and numerous organisations in advancing the PEO technology. He sits on the Technology Advisory Board for Keronite and is on the Editorial Board for the Journal of Surface Engineering. He is a Chartered Engineer, Chartered Scientist, Fellow (IOM3) and Fellow (IMechE).

VISHAL KHETAN

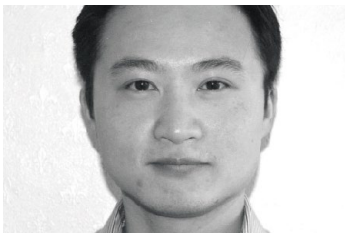
MARIE CURIE RESEARCH FELLOW, SCHOOL OF MECHANICAL ENGINEERING, UNIVERSITY OF LEEDS

Vishal Khetan is a Marie Curie Research Fellow and also works in close collaboration with Mercedes Benz Powertrains AMG. His work develops new laboratory methodologies for accurate simulation of internal combustion engine tribochemistry. Previously, he worked for CRP Gabriel Lippmann, Luxembourg with an AFR fellowship as a trainee researcher, undertaking a surface engineering project named SpiTriCoat and in parallel pursued a PhD degree with ULB, Brussels. His research produced two international peer-reviewed research publications and participation in six international/industrial conferences.

SPEAKERS AND CONTRIBUTORS

HEIDI LOVELOCK
MANAGER – SURFACE ENGINEERING, TWI

Heidi Lovelock manages the Surface Engineering Section at TWI, an independent research and technology organisation in Cambridge. She has over 25 years of industrial and applied research experience in the area of thermal spray coatings, weld hardfacing and high-temperature cobalt-based wear resistant alloys. She holds a Master's in Materials Science and is a Fellow of the Institute of Materials, Minerals and Mining.



DR LIUQUAN YANG
MARIE CURIE RESEARCH FELLOW, OERLIKON SOREVI (FRANCE)

Dr Liuquan Yang is currently working in Oerlikon Sorevi (France) as a Marie Curie Fellow. He is interested in coating development for optimised solutions related to DLC/thin film under lubricated conditions. Prior to Oerlikon, he read Process Systems Engineering at Cranfield University and Tribology at the University of Leeds, with a focus on the DLC/lubricant additives interactions.

TOBY MIDDLESMISS
PRODUCT MANAGER, OERLIKON BALZERS

Toby Middlemiss has been working for Oerlikon Balzers for nine years in the components segment. After completing degrees in Mechanical Engineering and Motorsport Engineering at Cranfield University, he worked for Balzers supporting the components markets with surface solutions, in particular looking at PVD thin film carbon coatings such as DLCs. More recently he has had a focus on developing coatings for the aerospace industry such as erosion-prevention coatings and chrome replacement solutions.

DR ANDREW GREENALL
PROJECT LEADER, SHELL MOTORSPORT LUBRICANT DEVELOPMENT

Dr Andrew Greenall is responsible for leading the development of high-performance lubricants in close collaboration with a number of motorsport teams in Formula One, MotoGP, World Superbikes, World Rally Championship, DTM and GT series. He joined Shell in 2011 in the Lubrication Science Team, which focused on understanding fundamental lubrication behaviour. His passion for motorsport led him to the development of race lubricants across Shell's wide range of motorsport disciplines. This, in turn, led to the exciting challenge of developing and delivering optimised race lubricants to Shell's technical partners to maximise the power, performance and durability of the respective engines.

DR. NAZLIM BAGCIVAN
DIRECTOR R&D SURFACE TECHNOLOGY, SCHAEFFLER

Dr. Nazlim Bagcivan is responsible for Schaeffler-wide R&D activities in the Competence Centre Surface Technology at Schaeffler Technologies. He studied mechanical engineering and specialised in aeronautical and space engineering. After his studies at RWTH Aachen University he received his doctorate from the Surface Engineering Institute at RWTH Aachen University. During the past 10 years he has been involved in R&D of surface engineering in various application fields in the automotive and aerospace industries and has authored/co-authored more than 140 publications in these fields. His current activities concentrate on the customer oriented development of industrial surface technology solutions in mass production.

BOOKING FORM

EVENT CODE: S6222AB

SURFACE ENGINEERING IN AUTOMOTIVE AND AEROSPACE INDUSTRIES
9 June 2015
University of Leeds, Leeds LS2 9JT

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	STANDARD RATE	VAT	TOTAL
Member, Institution of Mechanical Engineers	£275.00	£55.00	£
Member, supporting organisation	£275.00	£55.00	£
Non-member	£385.00	£77.00	£
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☐ Optional PVD Lab Tour (free to attend)

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www.imeche.org/events/L6217

16 June 2015
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Sustainable Vehicle Technologies (SVT) 2015 will examine the latest advances in propulsion and vehicle efficiency technologies with a view to understanding the latest developments of systems for carbon dioxide reduction over the entire vehicle lifecycle.

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