BHR Group
EXPERTS IN FLUID ENGINEERING

25th International Conference on
Fluid Sealing 2020
Manchester, 4th - 5th March 2020

Provisional Programme

Wednesday 4th March 2020

08:00 08:30 **Morning Registration**

08:45

Conference Chairman Welcome
Alan Bickley, Research Advisor, Weir Group, UK

Alan has a BSc Physics, MA Leading Innovation and Change, Chartered Engineer, FIMechE, FIMMM. Alan worked in materials, tooling, processing, product design and general management in elastomer businesses across the UK, Canada, USA, Japan and Malta for nearly 40 years. He is currently co-ordinating and directing the fundamental research carried out around the world for the Weir Group and contributing to several national and international technical bodies and organisations.

SESSION 1 – Legislation & Emissions

Chairman: Alan Bickley, Research Advisor, Weir Group, UK

09:00

Opening Keynote Address
Susan Michaelis, University of Stirling, UK

Presenting; Aircraft Air Quality Consultant; Head Of Research For The GCAQE

Dr. Susan Michaelis, a former Australian ATPL airline pilot holds a PhD in Safety Science, specifically addressing the health and flight safety implications of exposure to aircraft contaminated air. She holds an MSc (Masters of Science) in Air Safety and Accident Investigation and is a qualified air accident investigator. In 2017 she was awarded the Cranfield University MSc Course Director's best overall student for her MSc, which included a thesis reviewing how oil leaks in turbine engines. For over 20 years she has led much of the global research on the aircraft contaminated air issue and has widely published on this topic. She is also qualified in hazardous substances and general occupational health and safety. Susan has held the position of Head of Research for the Global Cabin Air Quality Executive since its formation in 2006 and she is also a visiting Researcher at the University of Stirling.

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09:40 **Liquid leak rate predictions in packed stuffing boxes**
A-H Bouzid, Ecole de Technologie Supérieure, Canada *(Page 5)*

10:10 **Industrial emissions directive compliance and the Sealing Industry**
D Mitchell, D Edwin-Scott, European Sealing Association, UK *(Page 19)*

10:40 Exhibitors presentation – BHR Group

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10:50 Exhibitors presentation - Trelleborg

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11:00 **Refreshment Break**

SESSION 2 – Cavitation

Chairman: Dr Noël Brunetière, CNRS, University of Poitiers, France

11:30 **Analysis of hydrodynamic performance of liquid film seals considering non-Newtonian and thermal effects**
F Liu, Z Li, X Sun, M Hao, T Li, China University of Petroleum, China (Page 31)

12:00 **Observation and pressure measurement of cavitation region in mechanical seal**
M Itadani, N Uemura, Eagle Industry Co Ltd, J Sugimura, Kyushu University, Japan (Page 45)

12:30 **Evaluation of cavitation in structured face seals**
D Bulut, N Bader, B Wennehorst, University Hannover, Germany

13:00 **Lunch**

SESSION 3 – High Pressure High Temperature

Chairman: David Edwin-Scott, European Sealing Association, UK

14:00

Keynote Address
Dan Hetherington, Project Leader, R&T - Seals, Safran Landing Systems

Dan holds a Bachelor of Engineering degree from Ryerson University in Toronto, Canada. Since graduation he has been employed 28 years at Safran Landing Systems in Canada, in the field of design, test and development of Aircraft Landing Gear shock absorbers, actuators and mechanisms. The last 6 years his work has been focused specifically at the operation of seals within Safran products to improve performance during test, production and in-service. Dan's tasks involve; investigations of poor seal performance, development testing of specific seal type/materials to meet the product performance requirements under the influence of various condition and investigations of material capability in specific applications of dynamics and/or extreme temperature conditions.

Presenting; Aircraft Landing Gear Systems – An Application of Seals

14:40 **Characterisation of Friction behaviour for dynamic O-ring seals during cyclic testing under extreme pressure and temperature conditions**
E Franciso Yanes Nunez, N Pugno, JJC Busfield, Queen Mary University, J Ramier, Schlumberger Cambridge Research Ltd, UK (Page 57)

15:10 **Innovative Kalrez® FFKM product for high temperature broad chemical & water/steam resistance**
W Braule, DUPONT, Switzerland

15:40 Exhibitors presentation - ESA

15:50 Exhibitors presentation - Wilde

16:00 Exhibitors presentation – BPMA

16:10 **Refreshment Break**

SESSION 4 – Elastomer and Polymer Seals

Chairman; Prof. James Busfield, Queen Mary University London, UK

16:40 **Improved performance by a new interpretation of elastomer contact seal**
M Wilke, H Jordan, Trelleborg Sealing Solutions, Germany (Page 71)

17:10 **Influence of static and dynamic eccentricity on the pumping rate of radial lip seals**
S Bekgulyan, S Feldmeth, F Bauer, Universität Stuttgart, Germany (Page 79)

17:40 **Close of Conference - Day 1**

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19:30 **Conference dinner**

The conference dinner will be held in house at the Hotel Football where we will enjoy a three-course meal

Dress code: Casual

Thursday 5th March 2020

SESSION 5 – Modelling – Part 1

Chairman: Dr Emily Ho, BHR Group

08:30 **Keynote Address - Tom Reddyhoff, Senior Lecturer in Tribology, Imperial College London**

Presenting; Research on Sealing Interfaces

Dr Tom Reddyhoff joined the Department of Mechanical Engineering at Imperial College in 2006 after completing his PhD in Tribology at the University of Sheffield. His team currently consists of five PhD students and four post-doctoral researchers. He has 60 peer reviewed publications, three granted patents, two best paper awards. He was awarded the IMechE Tribology Trust Bronze Medal in 2011 and has gained £2.5M in research funding. Tom has specialised in developing a range of experimental techniques, which he uses in combination with numerical modelling to analyse sliding interfaces and solve industrial problems. The techniques he has worked on include: i) ultrasonic sensing, ii) infrared and fluorescence microscopy, iii) electron mapping, iv) acoustic emission monitoring. Practical applications of his research include: i) controlling windscreen wiper sealing for Bosch and Hyundai, ii) enhancing piston-liner performance for Ford and Volvo Trucks, iii) analysing emulsion behaviour in cold rolling contacts for TATA Steel, iv) understanding tongue/palate/beverage interactions for PepsiCo, v) improving automotive seals for Toyota.

09:10 **Application of Modelling and Simulation to the Selection of a Fuel Pump Mechanical Seal**
L Reszke, S E Leefe, Wilde Analysis Ltd, R Reeve, D Neate, M K Yates, Rolls-Royce Control Systems, UK *(Page 95)*

09:40 **Numerical leak prediction of elastomeric seals**
T Hohenberger, J Busfield, N Pugno, Queen Mary University, London, W Lan, H Jin, Schlumberger Ltd, USA *(Pg 109)*

10:10 **Refreshment Break**

SESSION 5 – Modelling – Part 2

Chairman: Dr. Emily Ho, BHR Group

10:40 **Mechanical variations affecting sealing performance in redox flow batteries**
D Jannes, F Bauer, L Hörl, Universität Stuttgart, Germany *(Page 120)*

11:10 **Friction reduction and reliable sealing with rotating radial shaft seals**
V Pelzer, G Poll, University Hannover, Germany

11:40 **Heat Transfer of Couette Flow in Micro-channels: an Analytical Model of Seals**
S Shabbir, S Garvey, S Dakka, University of Nottingham, UK *(Page 134)*

12:10 **Lunch**

SESSION 6 – Mechanical Seals

Chairman: Dr. Chris Carmody, AESSEAL, UKZ

13:10 **Experiment test on leakage and stator temperature of herringbone grooved liquid film seals**
Y Li, M Hao, X Sun, H Liu, P Sun, Z Li, China University of Petroleum, China (Page 151)

13:40 **Surface texturing to reduce temperature in mechanical seal**
K Dinguy, N Brunetière, J Bouyer, Université de Poitiers, M Adjemout, Latty International, France (Page 162)

14:10 **Refreshment Break**

SESSION 7 – Advanced Materials

Chairman: Dr. Mike Eason, James Walker, UK

14:40 **An extended Approach for the Description of Counter Surfaces for Reciprocating Seals**
M Wilke, H Jordan, Trelleborg Sealing Solutions, Germany (Page 173)

15:10 **A novel sealing material: concentrated polymer brush**
N Suzuki, NOK Corporation, T Fukuhara, Eagle Industry Co Ltd, K Sakakibara, Y Tsujii, Kyoto University, Japan (Page 184)

15:40 AIRBUS

Special Session Presented by Airbus

Discussing; NAS1613 & EN6111 Standards for Ethylene Propylene Seals used in Phosphate Ester Hydraulic Fluid

In the Airbus seal supply chain today ethylene propylene sealing compounds are proliferating: there are more than 30 different known ethylene propylene compounds on the market, conforming to a myriad of different published standards and internal standards, but in the past 10 years significant changes have been made and consequently some legacy standards are being updated to ensure we meet the needs of the industry, while other newer standards are also being introduced alongside. In this session, forthcoming changes to current, new and yet-to-be issued standards will be discussed, notably; NAS13 Revision 7, EN6111 and AMS7361.

16:20 **Presentation of Best Paper Award** BHR Group EXPERTS IN FLUID ENGINEERING

16:30 **Conference Chairman - Close of Conference**

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