

Final Programme

Tuesday 6th March

- 13:00 - 17:30** **Pre-Conference Course – ‘Practical considerations for seal duties and reliability’**
Hilton Manchester Airport Hotel
Those who have registered for the course, please meet at 12:50 in the Hanover Room
- 19:00 - 20:30** **Early Registration Reception at Hilton Manchester Airport Hotel, JFK Suite**
Collect your delegate pack, meet your peers and enjoy a glass of bubbly and canapés!

Wednesday 7th March

- 07:30 - 08:00** **Morning registration at Hilton Manchester Airport Hotel**
Outside the Schiphol Suite

08:25 - 08:30

Conference Chairman Welcome

Alan Bickley, Director Weir Advanced Research Centre, Weir Group

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.



Proceedings page
number ↓

SESSION 1: Reciprocating Seals

Chairman: Dr Nick Peppiatt, Hallite Seals International Ltd



Nick has BSc and PhD degrees from the Department of Mechanical Engineering, University of Bristol in England. Nick joined Hallite in 1982 and has a wide ranging experience of the testing, design and use of seals for fluid power applications. Previously Technical Manager; retired from full-time work in March 2012 and now works as a part-time consultant. Author of over 20 published papers on the use and application of reciprocating seals. Is a member of the following committees: Chairman of BFPA Technical Committee TC7 ‘Seals and their housings’ (Incorporating BSI MCE11 ‘Fluid seals and their housings’), Convenor ISO TC131/SC7/WG2 ‘Dimensions for seal housings’, Member of other ISO TC131/SC7 working groups.

08:30 - 09:05

Opening Keynote Presentation

Dan Hetherington, Safran Landing Systems, Canada
Aircraft landing gear systems – an application of seals



- 09:05 - 09:30** **Friction behaviour of contact seals in the boundary condition (stick slip)**
M Wilke, H Jordan, Trelleborg Sealing Solutions, Germany

257

09:30 - 09:55 One-dimensional model for the dirt ingress behaviour of wiper seals
F Will, J Popken, J Weber, TU Dresden, Germany

265

09:55 - 10:00 Exhibitor presentation – BHR GROUP

BHR Group
EXPERTS IN FLUID ENGINEERING

10:00 - 10:05 Exhibitor presentation – TRELLEBORG



10:05 - 10:35 Refreshment break with exhibitors

SESSION 2: Liquid & Mechanical Seals Part 1
Chairman: Professor Pengyun Song, Kunming University of Science and Technology



Pengyun is a Tutor of doctorate candidate. Current project: The mechanism of the real gas effect on the performance of the dry gas seal which is financially supported by the National Natural Science Foundation of China.

10:35 - 11:00 Influence of misalignment on full-face cavitation and steady-state performance of liquid film seals **207**
Y F Li, M M Hao, Y L Wang, Z T Li, China University of Petroleum (East China), China

11:00 - 11:25 Influence of fluid flow regime on the performance of water lubricated spiral groove face seals **231**
M Rouillon, N Brunetière, CNRS - Université de Poitiers – ENSMA, France

11:25 - 11:50 The multi-objective optimization focused on the pumping action for zero-leakage and low-friction texturing mechanical seals **245**
H Suzuki, T Imura, Y Tokunaga, Eagle Industry Co. Ltd, Japan

11:50 - 12:50 Lunch in the restaurant

12:50 - 13:25

Keynote Presentation

Mark Richardson, James Walker & Co, UK
The implications for valve manufacturers to the changes in fugitive emissions valve standards



SESSION 3: Lip Seals Part 1

Chairman: Mr Robert Flitney, C.Eng. MIMechE, Retired



Robert's early engineering experience involved the operation and maintenance of power and process plant in the marine and food industries. This was followed by 35 years at BHRA/BHR Group involved with R&D on sealing technology and associated high pressure systems. Responsible for a number of major collaborative industrial research projects covering reciprocating seals for hydraulic systems, mechanical seals in the process industry plus oilfield applications of elastomers and high pressure downhole hydraulics. Manager of the sealing R&D activities from 1993 to 2004. From 2004 to 2016 has been a self-employed consultant, assisting with a wide range of sealing applications, plus providing training to both seal users and manufacturers. During this time has authored the Fifth and, current, Sixth edition of the Seals and Sealing Handbook. Also Editor of Sealing Technology Newsletter from 2003 to 2014.

13:25 - 13:50 A new innovative design for shaft seals 119
M Stoll, N Dakov, L Hörl, F Bauer, University of Stuttgart, Germany

13:50 - 14:15 Influence of belt ground and superfinished shaft counterfaces on the tribological and functional behaviour of elastomeric lip seals 143
M Schulz, M Baumann, F Bauer, University of Stuttgart, Germany

14:15 - 14:20 Exhibitor presentation – ESA



14:20 - 14:25 Exhibitor presentation – AMTEC



14:25 - 14:55 Refreshment break with exhibitors

SESSION 4: Advanced Materials

Chairman: Mr Alan Bickley, Weir Group (Conference Chairman)

14:55 - 15:20 Low temperature sealing – a practical guide to measurement 91
A Douglas, M Mitchell, D Edwin-Scott, European Sealing Association

15:20 - 15:45 Development of elastomeric materials for seals in gas-distribution systems 47
A Farid, ARTIS, UK

15:45 - 16:10 Arrhenius polymer life prediction 5
E Ho, BHR Group, UK

16:10 - 16:35 Assessment of leak tightness for swellable elastomeric seals considering fluid-structure interaction with the CEL approach 15
Y Gorash, University of Strathclyde, UK; A Bickley, Weir Advanced Research Centre, UK; F Gozalo, Weir Minerals, USA

16:35 - 17:00 Evaluation of compounding techniques for optimisation of sealing performance of nitrile rubbers 67
A Farid, ARTIS, UK

17:00 - 17:05 Stretch Break

SESSION 5 : Poster Session

Chairman: Dr Emily Ho, BHR Group

Emily Ho is a fellow of the Institute of Mechanical Engineers and has been part of the IMechE oil, gas and chemical committee since 2003. She is also a member of the Fluid Sealing working group in the ISO Fluid Power Systems and Components Technical Committee. Her core expertise includes thermodynamics, fluid mechanics, process engineering, fluid sealing and material science. She works with high temperature high pressure inflammable fluids and toxic gases, bioethanol, steam, process chemicals and cryogenic fluids. She undertakes engineering consultancy for modelling and testing elastomer seals in valves and actuators, for gaskets in fuel cell stacks, for sealing nuclear fuel transport flasks, for gas transmission system seal failure analysis, for packer, hose, cable and polymer liner integrity studies. Emily has over 20 years' experience in leading process and equipment, research and development projects from concept, feasibility study, scaleup, plant design, installation to commissioning. She wrote the Research Report RR485 for the Health and Safety Executive, UK (HSE) to advise the oil and gas industry in the use of elastomeric seals for rapid gas decompression applications in high-pressure service.



17:05 - 17:15 Consideration of fluid-structure interaction with the CEL approach for the FE-prediction of a blow-off pressure for an elastomeric seal 31
N Morrison, Y Gorash, R Hamilton, University of Strathclyde, UK

17:15 - 17:25 Development of gas barrier coatings N/A
L Youd, Weir Group, D Bucknall, S Gagliardi, V Arrighi, K Johnston, Heriot-Watt University; UK

17:25 - 17:35 Gas permeation of 2D nanomaterial-elastomers N/A
L Youd, Weir Group, D Bucknall, S Gagliardi, J Glen, Heriot-Watt University; UK

17:35 Sessions Close

Conference Dinner

19:30

The conference dinner will be held in house at the Hilton Manchester Airport, where we will enjoy a three course meal. Dinner will be served at 19:30 in the Schiphol Suite.

Dress code: Smart/Casual

Thursday 8th March

SESSION 6: Turbo/Gas Seals

Chairman: Dr Chris Carmody, AESSeal plc (UK)



Chris started his career as a maintenance engineer in the chemical and process industry and joined AESSEAL as the companies first full time mechanical seal designer and development engineer. Chris went on to academia for a bachelor's degree, a master of science in structural integrity and doctoral degree on the fluid structure interaction of bioprosthetic heart valves. He re-joined industry as a Consulting engineer and worked on many prestigious projects such as the A380 Airbus, the award winning Falkirk wheel and the new Wembley stadium. Chris returned to AESSEAL and took up the position of special products manager where he is responsible for development of high integrity sealing projects including dry gas seals. He now has 25 years of experience in the design of mechanical seals and maintenance products and is a named inventor on many of AESSEAL product designs. In addition to his responsibilities at AESSEAL he also sits on several different bodies including the API692 Compressor Dry Gas Seal Committee and has lectured all over the world on sealing, maintenance and reliability matters.

09:00 - 09:35

Keynote Presentation

Susan Michaelis, University of Stirling, UK

Bearing chamber sealing and the use of aircraft bleed air

279



09:35 - 10:00 The performance of high-pressure dry gas seal influenced by the real gas choked flow at the exit 295

H Xu, P Song, Kunming University of Science and Technology, China

10:00 - 10:15 How the UK's innovation agency supports Advanced Materials Innovation N/A

Sally Beken - Lead Technologist Advanced Materials - Innovate UK

10:15 - 10:45 Refreshment break with exhibitors

SESSION 7: Lip Seals Part 2

Chairman: Dr Sally Beken, Innovate UK



Sally works as a Lead Technologist in Advanced Materials at Innovate UK. Innovate UK drives productivity and growth by supporting businesses to realise the potential of new technologies, develop ideas and make them a commercial success. Sally holds a degree in chemistry and a doctorate in polymer technology. She has nearly 30 years' experience of R&D and manufacturing in the polymer industry with a particular focus on elastomers and the medical industry. She holds a number of sealing patents and has been networking in the UK polymer sector for over 15 years.

10:45 - 11:10 Multiscale simulation of a novel PTFE lip seal design 161

N Dakov, M Stoll, L Hörl, S Feldmeth, F Bauer, University of Stuttgart, Germany

11:10 - 11:35 Friction reduction and reliable sealing with rotating radial shaft seals 133

V Pelzer, G Poll, Leibniz Universität Hannover, Germany

11:35 - 12:00 **Performance evaluation of radial shaft seals of automotive transmission systems** **N/A**
E Kozuch, N Norris, R Rahmani, H Rahnejat, Loughborough University, UK, P Nomikos, Neapco Europe GmbH, Germany

12:00 - 13:00 **Lunch in the restaurant**

SESSION 8: Liquid & Mechanical Seals Part 2 / Flange Joints & Valves
Chairman: Dr Noël Brunetière, Institut Pprime

Noël Brunetière is a forty-four years old researcher in mechanical engineering. He is working in the field of tribology and more particularly on mechanical seals at the Pprime Institute of Poitiers (France) since 1997. He received his PhD degree in the field of mechanics in 2001. He became professor assistant in mechanical engineering at the University of Poitiers in 2002. He holds now a position of researcher at the CNRS (French research council).



13:00 - 13:25 **Influence of taper and angular misalignment on performance of spiral groove two-phase seals** **221**
H C Cao, M M Hao, Y H Wang, W J Yang, China University of Petroleum (East China), China

13:25 - 13:50 **Generalization of lubricating and sealing performances using dimensionless parameters on low-friction and zero-leakage mechanical seals** **193**
Y Tokunaga, H Inoue, Eagle Industry Co. Ltd, J Sugimura, Kyushu University; Japan

13:50 - 14:20 **Refreshment break with exhibitors**

14:20 - 14:45 **Effects of surface topography on sealing performance of spiral groove liquid film seal** **179**
W J Yang, M M Hao, H C Cao, L Xu, Y L Wang, J Yuan, China University of Petroleum, China

14:45 - 15:10 **FEM superelement technique applied to oil and gas bolted flange connections** **105**
I Coria, I Martin, I Heras, M Abasolo, University of the Basque Country, Spain; A-H Bouzid, University of Quebec, Canada

15:10 - 15:30 **Close of conference**
BHR Group presentation of the best paper award!