

# 12TH EUROPEAN FLUID MACHINERY CONGRESS

Institution of  
**MECHANICAL  
ENGINEERS**

Fluid Machinery Group  
**Conference**

6-7 October 2014  
The Waldorf Astoria Edinburgh -  
The Caledonian  
**[www.imeche.org/events/C1395](http://www.imeche.org/events/C1395)**



### Following the success of our previous European Fluid Machinery Congress we are returning to Edinburgh this October for the 12th event in the series.

Manufacturers and engineers face growing challenges as technology develops. Ever more stringent demands are driving changes in industry operating practices, while new emerging applications such as shale gas and coal bed methane impose demands for operation under high pressures and temperatures.

This congress showcases the latest fluid machinery technology available and provides a forum for sharing valuable experiences around design, operation and maintenance.

Hear from industry leaders from **BP, AESSEAL PLC, Shell,** and **TNO** to learn how you can improve fluid machinery efficiency and save your company money.

**WHEN** 6-7 October 2014  
**WHERE** Caledonian Hilton, Edinburgh  
**BOOK ONLINE** [www.imeche.org/events/C1395](http://www.imeche.org/events/C1395)

#### BENEFITS OF ATTENDANCE:

- **Discover** the latest advances in fluid machinery technology
- **Learn** about new reciprocating compressor solutions for offshore applications
- **Examine** root cause analysis of vibration in pipe systems with centrifugal pumps
- **Understand** the challenges in the design of centrifugal pumps for ultra-high-pressure injection duties
- **Find out** how to improve your critical machine 'up time'
- **Develop** your understanding about thermal spray coatings for fluid machinery

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# PROGRAMME

**DAY 1**

**MONDAY 6 OCTOBER 2014**

**09:00**

**REGISTRATION AND REFRESHMENTS**

**TURBOMACHINERY  
DEVELOPMENT**

## SESSION 1

**09:30**

**WELCOME AND INTRODUCTION**  
Ivor Rhodes, ACE Cranfield Ltd

**09:40**

**KEYNOTE: A RETROSPECTIVE REVIEW OF SOME TROUBLESOME TURBINE BLADE FAILURES**  
Dr. Harrald Carrick, Prime Ltd

- A variable speed machine - 10MW steam turbine driving a recycle gas compressor
- A constant speed machine - two casings of an air compressor
- Measures adopted to prevent repetition

**10:10**

**OPTIMISATION OF EFFICIENCY OF AXIAL FANS**  
Dr. Niels Kruyt, University of Twente, Pepijn Pennings, Delft University of Technology, Ruud Faasen, Vostermans Ventilation

- Design method
- Three-dimensional blade shape
- RANS-based CFD-simulations

**10:35**

**CFD ANALYSES OF THE PULSATILE FLOWS IN A TWIN-ENTRY RADIAL TURBINE**  
Mahfoudh Cerdoun, Ecole Militaire Polytechnique, Adel Ghenaiet, University of Sciences and Technology

- Geometric modelling and grid generation
- Performance of a twin radial turbine under pulsating flow
- Analysis of volute/rotor/diffuser interactions

**11:00**

**NETWORKING BREAK**

**MECHANICAL  
SEALING**

## SESSION 2

**11:30**

**API TYPE PRESSURISED DUAL SEALS - DESIGN CONFIGURATIONS FOR CONTAMINATED UPSTREAM PUMPING APPLICATIONS**  
Richard Jonathon Smith, AESSEAL PLC

- Performance comparison of differing configurations
- Barrier fluid pressures
- Seal Faces Optimisation

**11:55**

**COUPLED MODELLING OF MECHANICAL SEAL FACES AND SECONDARY SEAL ASSEMBLIES**  
Dr. Christopher John Carmody, AESSEAL PLC

- Modelling techniques
- Design features
- Multi-physics models

**12:20**

**NETWORKING LUNCH**

**CENTRIFUGAL  
PUMPS  
OPERATIONAL  
PROBLEMS  
& SOLUTIONS**

## SESSION 3

**13:20**

**EXPERIMENTAL INVESTIGATION OF PRESSURE FLUCTUATIONS IN A HIGH-ENERGY CENTRIFUGAL PUMP STAGE AT OFF-DESIGN CONDITIONS**  
Dr. Stefan Berten, Sulzer Pumps Ltd, Mohamed Farhat, François Avellan, Laboratory for Hydraulic Machines, Philippe Dupont, Sulzer Pumps Ltd

- Rotor-Stator interaction in centrifugal pumps
- Experimental investigations
- Detection of flow separation

**13:45**

**COATINGS HELP TO IMPROVE CENTRIFUGAL PUMP RELIABILITY**  
Vugar Mammadov, BP International, Ken Tacon, BP Exploration & Production Company Limited, Ben Davies, Sulzer Pumps, Natig Ahmedov, BP Exploration Caspian Sea Limited

- Reliability targets for centrifugal pumps
- Surface hardening treatments to improve pump service life
- Pump design and operating constraints

# PROGRAMME

## DAY 1 MONDAY 6 OCTOBER 2014

- 14:10 FIBRE REINFORCED CERAMIC BEARINGS FOR COOLING WATER PUMP APPLICATIONS**  
Michael Peters, DOW Chemical
- Cooling water system
  - Operation pump problems
  - Fibre reinforced bearings

**14:35 NETWORKING BREAK**

### SCREW COMPRESSORS DEVELOPMENT & OPERATION

#### SESSION 4

- 15:05 SCREW COMPRESSORS WITH VARIABLE GEOMETRY ROTORS - ANALYSIS OF DESIGNS BY CFD**  
Professor Ahmed Kovacevic, Rane Sham, Nikola Stosic, City University London
- Grid generation for variable geometry screw rotors
  - Performance of compressors with various configurations
  - Pressure variations

- 15:30 A WORKING CONICAL SCREW COMPRESSOR**  
Olly Dmitriev, Eugene Tabota, VERT Rotors
- Up to 22 bar (air) at 1000 rpm in a single stage
  - Principles of operation and test results
  - CAD software for automatic building of conical screws

- 15:55 DESIGN OF NEW SILENCERS FOR A SCREW COMPRESSOR**  
Leonard Van Lier, Harry Korst, Jan Smeulders, TNO
- Pulsation analysis of compressor systems
  - Impact of variance in the gas composition
  - Field case; history and mitigation strategies

**16:20 CHAIR'S CLOSING REMARKS**

**16:30 CLOSE OF DAY ONE**

**19:00 CONFERENCE DINNER**

## DAY 2 TUESDAY 7 OCTOBER 2014

**08:30 REFRESHMENTS**

**09:00 CHAIR'S OPENING REMARKS**  
Ivor Rhodes, ACE Cranfield Ltd

### FLUID MACHINERY MODELLING PART 1

#### SESSION 5

- 09:10 KEYNOTE: REVIEW AND STATE OF THE ART OF REGENERATIVE LIQUID RING PUMPS**  
Nilla-Helene Donata Karlsen, George Athanasios Aggidis, Lancaster University
- Mathematical analysis
  - Computational modelling
  - Experimental testing

- 09:40 VIBRATION EFFECTS OF ENTRAPPED LIQUIDS**  
Bert Koop, Siemens, Frits De Jongh, Turbocare
- Gas turbine driven centrifugal compressor units testing
  - Analysis and experimental verification
  - Influences of synchronous behaviour of entrapped oil

- 10:05 A CFD STUDY ON DESIGN PARAMETERS ACTING IN CAVITATION OF POSITIVE DISPLACEMENT PUMP**  
Aldo Iannetti, Matthew Stickland, William Dempster, Strathclyde University
- Description of the problem, CFD model and adopted hypothesis
  - Discussion of the results obtained
  - Conclusion (discussion of the capability of CFD technique and future improvements)

**10:30 NETWORKING BREAK**

## PROGRAMME

### FLUID MACHINERY MODELLING PART 2

#### SESSION 6

11:00

#### **THEORETICAL ANALYSIS TO CALCULATE AXIAL THRUST IN MULTISTAGE CENTRIFUGAL PUMPS**

**Abhishek Bhatia, ClydeUnion Pumps**

- Axial thrust in multistage centrifugal pumps
- Rotor-Stator flow model
- Theoretical modelling and results

### TURBOCOMPRESSOR OPERATION

#### SESSION 7

11:25

#### **COMPARATIVE STUDY OF DIFFERENT EROSION MODELS IN AN EULERIAN-LAGRANGIAN FRAME USING OPENFOAM®**

**Alejandro López, Matthew Stickland, William Dempster, University of Strathclyde**

- Erosion models
- Wear profiles
- Open source CFD package

11:50

#### **NETWORKING LUNCH**

13:00

#### **SHELL LEMAN COMPRESSION UPGRADE PROJECT**

**Murray Forsyth, Shell UK Ltd, Pierpaolo Rocchi and Francesco Campanile, GE Oil and Gas**

- Refurbishment/replacement of ageing or obsolescent topside equipment
- Equipment selection, specification and design
- Manufacture, testing, installation and pre-commissioning

13:25

#### **GRONINGEN 2ND PHASE COMPRESSION PROJECT**

**Eunice Liow, Nederlandse Aardolie Maatschappij, Herbert Goorhuis, Shell Projects & Technology**

- Double End Driven Compression train with Active Magnetic Bearings (AMBs)
- Pilot plant as demonstrator
- Risk assessment and development assurance program

13:50

#### **DEVELOPMENT OF A REACTIVE SILENCER FOR TURBO COMPRESSORS**

**González Díez Néstor, Jan Smeulers, TNO**

- Turbo compressors can generate tonal noise
- Principal mechanisms for the reduction of sound
- Silencer design and acoustic modelling

14:25

#### **AGEING OF CENTRIFUGAL COMPRESSORS**

**Barry Hall, Dr. Aiyad Gannan, Altug Bilgic, Weir**

- Managing equipment life cycle
- Inspection
- Compressor maintenance strategy

14:50

#### **CHAIR'S CLOSING REMARKS**

15:00

#### **END OF CONFERENCE**

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- **John Middleton**, Consultant
- **Dr. Harald Carrick**, Process Industry Machinery Expertise (PrIME)
- **Arie Aartsen**, ArtsenCrafts BV
- **Professor Ahmed Kovacevic**, City University London
- **Robert Brown**, Sulzer Pumps
- **Paul Hancock**, Aker Solutions
- **Frits de Jongh**, Turbocare (a Siemens company)
- **Jan Smeulers**, TNO Science and Industry
- **Pharic Smith**, Weir Engineering Services
- **Stephen Shaw**, AESSEAL (Group Engineering Director)
- **Simon Whatley**, Thames Water
- **Andrew Walker**, Sabic Europe

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# BOOKING FORM

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**12TH EUROPEAN FLUID MACHINERY  
CONGRESS**  
6-7 OCTOBER 2014  
WALDORF ASTORIA EDINBURGH -  
THE CALEDONIAN, EDINBURGH EH1 2AB

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1 Birdcage Walk

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[www.imeche.org/events/L6118](http://www.imeche.org/events/L6118)

#### PUMP FUNDAMENTAL PART A WORKSHOP

17 September 2014  
1 Birdcage Walk

This one-day course is designed to enable individuals with a general engineering or commercial background to gain an understanding of the principles associated with the pumping of liquids.

[www.imeche.org/events/W1686](http://www.imeche.org/events/W1686)

#### PUMP FUNDAMENTAL PART B WORKSHOP

18 September 2014  
1 Birdcage Walk

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[www.imeche.org/events/W1687](http://www.imeche.org/events/W1687)

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