

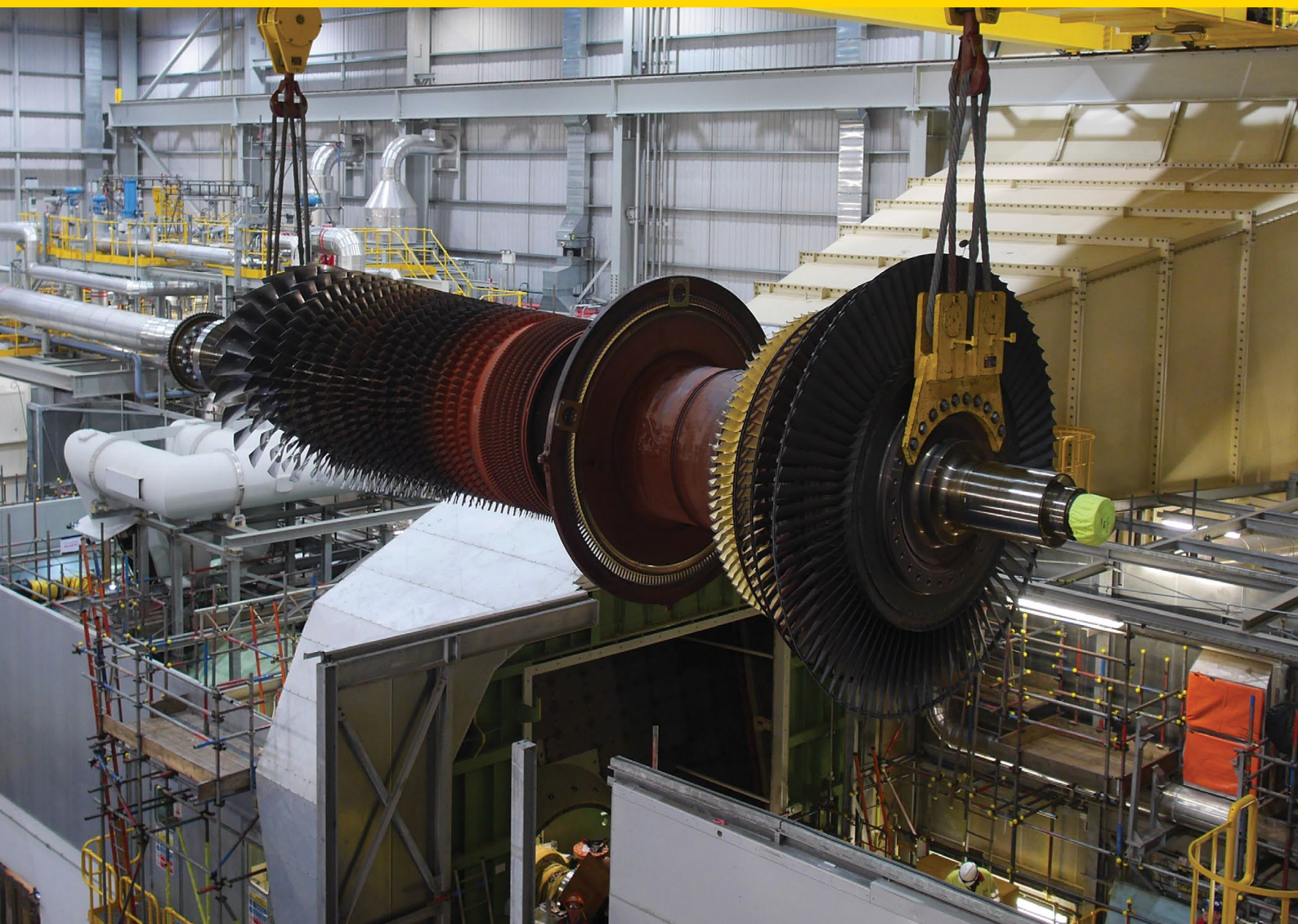
# POWER GENERATION GAS TURBINE USER GROUP

Institution of  
**MECHANICAL  
ENGINEERS**

24-25 June 2015  
London

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Power Division  
Conference



# POWER GENERATION GAS TURBINE USER GROUP

24-25 June 2015, London



## THE TWO-DAY EVENT IS THE NEXT IN THIS POPULAR SERIES OF THE INSTITUTION'S POWER GENERATION USER GROUPS.

This event will enable those involved in the management, operation and maintenance of gas turbines to discuss common problems and issues, exchange ideas, identify potential solutions and learn about new developments.

The Institution's User Groups encourage open debate and problem-solving, using informal presentations and discussion forums to promote networking and sharing experiences among the gas turbine community.

### BENEFITS OF ATTENDANCE:

- **Learn** from real-life case studies illustrating project experience and best practice
- **Improve** the performance of your plant
- **Discover** updates on the latest industry developments and technologies
- **Hear** advice from leading specialists on a wide number of issues
- **Understand** how to manage and minimise plant risks

### OUR EXPERT SPEAKING PANEL INCLUDES:



**CLIVE MOFFATT**  
MANAGING CONSULTANT, MOFFATT ASSOCIATES



**DAVID GRAHAM**  
TECHNICAL CONSULTANT, E.ON TECHNOLOGIES



**JOHN BOOTH**  
MAINTENANCE SECTION HEAD, RWE STAYTHORPE POWER STATION

See page 6 for full speaker list

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# PROGRAMME

## DAY 1

WEDNESDAY 24 JUNE 2015

**08:30 COFFEE AND REGISTRATION**

**09:00 CHAIR'S OPENING REMARKS**

**09:15 KEYNOTE: THE NEW POLITICS OF ENERGY**

**Clive Moffatt, Managing Consultant, Moffatt Associates**

- Explore a critical assessment of future energy policy and its impact on gas generation
- A post-election analysis and review
- Gain insight into the evolution of energy policy – priorities and conflicts

### SESSION 1 - MARKET CONDITIONS

**09:45 GAS TURBINE EMISSIONS COMPLIANCE UNDER THE INDUSTRIAL EMISSIONS DIRECTIVE**

**David Graham, Technical Consultant, E.ON Technologies**

- Review the implementation of the Industrial Emissions Directive (IED) for gas turbines (NO<sub>x</sub> and CO)
- Describe how Start-Up and Shut-Down rules are defined by the European Commission
- Consider new arrangements for emissions regulation below 70% load in the UK

**10:15 PLANT MODIFICATIONS TO MATCH CHANGING MARKET CONDITIONS**

**Thomas Krogh, Principal Project Manager, Ramboll – Energy**

- Gain insight into the Silkeborg CHP Plant
- Explore the several upgrades and modifications that have been implemented to match the changing market conditions
- Discuss the original concept of the plant, review the modifications carried out and list the benefits achieved

**10:45 QUESTION AND ANSWER SESSION**

**11:00 NETWORKING REFRESHMENT BREAK**

### SESSION 2 - LIFE EXTENSION

**11:30 CREEP-FATIGUE INTERACTION DURING FLEXIBLE PLANT OPERATION**

**Jon Douglas, Group Leader Materials Performance, Frazer-Nash Consultancy**

- Methods for the assessment of the interaction between creep and fatigue of components
- Developed sophisticated methods for component lifetime assessment
- Understand material responses to thermal and mechanical load cycles to understand how damage accumulates in high-integrity components

**11:55 ANALYSIS AND SAMPLING APPROACH TO ASSESS ROTOR LIFE EXTENSION**

**Mike Wood, Principal Gas Turbine Consultant, Edif ERA Technology**

- Explore the assessment of rotor disc post by reverse engineering and analysis
- Understand fracture mechanics assessment for defect sensitivity
- Sampling of material from rotor for toughness estimation

**12:20 GAS TURBINE COMPONENT LIFE EXTENSION AND ITS EFFECT ON THE COST OF OWNERSHIP**

**Clifford Smith, Independent Engineering Consultant, CSGT Consultancy**

- Explore life extension through component repair as one method of achieving the goal of reducing costs
- Understand why it is desirable and how it can achieve gas turbine component life extension
- Define gas turbine component repair: what is involved, where, within a gas turbine, is it most effective?

**12:45 NETWORKING LUNCH**

**13:45 THE USE OF LASER METAL DEPOSITION (LMD) FOR GAS TURBINE COMPONENTS**

**Roger Fairclough, Principal Project Leader, Joining Technologies Group, TWI Technology Centre (Yorkshire)**

- Explore the benefits of this technology to the welding/deposition of difficult and crack-prone alloys
- Improve surface properties for corrosion and wear resistance and to repair and rebuild worn and damaged parts
- Demonstrate the adaptability and innovation of the process with relevant applications with still and movie clips

**14:10 QUESTION AND ANSWER SESSION**

**14:25 SITUATIONAL PROBLEM-SOLVING ROUNDTABLE DISCUSSION**  
Delegates will be able to flex their development and application skills by participating in two roundtable discussions. Each table will be presented with a hypothetical project and introduced to an unexpected situation that interrupts the project's development. Each table will have just 40 minutes to develop a strategy and timescale to resolve the problem and to get the initial project back on track, followed by a report of key conclusions and the opportunity for questions and answers.

**15:10 NETWORKING REFRESHMENT BREAK**

**15:40 SITUATIONAL PROBLEM-SOLVING ROUNDTABLE DISCUSSION CONT.**

### **SESSION 3 - NEW TECHNOLOGY**

**16:25 ADVANCED GAS TURBINE VALIDATION UPDATE**  
**Marcus Scholz, Technical Director, Advanced Combined Cycles, General Electric**

- Achieve new records in efficiency and reliability through adapting many aero engine technology features
- Understand the role of engine validation in the process of maturing advanced technology
- Learn from the first 9HA gas turbine which has been operated for over half a year over a range of operating conditions

**16:50 FUEL GAS PERFORMANCE HEATING WITH DIFFUSION BONDED HEAT EXCHANGERS**  
**Robert Broad, Business Development Manager, Heatric**

- Comparison of compact heat exchangers to conventional shell and tube exchangers in fuel gas performance heating for efficiency improvements
- Ability to go to higher temperatures and pressures without mechanical limitations of shell and tube exchangers
- Modular approach to fuel gas, with the possibility to close couple to gas turbine

**17:15 QUESTION AND ANSWER SESSION**

**17:30 END OF CONFERENCE DAY ONE**

## **DAY 2**

**THURSDAY 25 JUNE 2015**

**08:30 COFFEE AND REGISTRATION**

**09:00 CHAIR'S OPENING REMARKS AND RECAP OF DAY ONE**

**09:15 RESULTS AND KEY FINDINGS FROM ROUNDTABLES**  
Each of the facilitators from the roundtable discussions will present the delegation with their key challenges and solutions from the discussion. Delegates will also be given time to present questions to each of the facilitators.

**10:00 GT26 OPERATIONAL EXPERIENCE UNDER CHANGING MARKET CONDITIONS**  
**Confirmed Representative, Alstom Power**

- Gain insight into the changing market conditions, particularly in Europe
- Alstom Power and improvements in the operational flexibility and experience
- Discover the high importance of keeping the efficient CCPPs as long as possible in operation as an alternative to compensate for the varying power supply

**10:30 NETWORKING REFRESHMENT BREAK**

**11:00 STAYTHORPE 1740 MW CCGT – OPERATIONAL EXPERIENCES AND IMPROVEMENTS SINCE BUILD IN 2009, INCLUDING 4 ALSTOM GT26 MXL UPGRADES**  
**John Booth, Maintenance Section Head, RWE Staythorpe Power Station**

- Challenging market conditions for CCGT owners, the need for very flexible, efficient CCGT plants
- Insight into the background and decision to upgrade a relatively new CCGT after only four years and contractual ways forward in capital-constrained environments
- Explore the planning, site works and results since the build

- 11:30**     **EVOLUTION OF OUTAGE SUPPORT AND MAINTENANCE STRATEGY**  
**Matt Rudge, Gas Turbine Engineer, E.ON Technologies**
- Understand the approaches and applications adopted by E.ON Technologies (ETG)
  - Explore the benefits of working both with and independently of the OEM
  - Insight into how OEMs have become more aware of the financial constraints concerning users
- 12:00**     **REMOTE ONLINE GAS TURBINE MONITORING**  
**Seth Muthuraman, Condition Monitoring Engineer, SSE**
- Gain insight into gas turbine condition monitoring using model-based technology
  - Hear innovations in gas turbine combustion dynamics monitoring
  - How to address gas turbine vibration monitoring
- 12:30**     **QUESTION AND ANSWER SESSION**
- 12:45**     **NETWORKING REFRESHMENT BREAK**

#### **SESSION 4 - PROCESS EXCELLENCE**

- 13:45**     **POWER PLANT PERFORMANCE ASSESSMENT PROCESS**  
**Tim Eastwood, Business Development Director, Alstom Power**
- Understand how the power market is changing rapidly and what the industry can expect going forward
  - Develop a collaborative approach to understanding how to optimise the customer's power plants
  - Identify areas to be addressed to optimise the plants for performance, capacity, longevity or other drivers
- 14:15**     **MAJOR MAINTENANCE PRACTICES: CAPITAL PARTS TRACKING**  
**Jon Willis, Director, Strategic Power Systems International (UK)**
- Understand the specific goal of monitoring and reporting on turbine systems
  - Explore the significant change within the industry both structurally and technologically
  - Address the support systems to secure strong infrastructure
- 14:45**     **QUESTION AND ANSWER SESSION**
- 15:00**     **NETWORKING REFRESHMENT BREAK**
- 15:20**     **FACTORS DRIVING LOSSES ON GAS TURBINES**  
**Syd Regan, Senior Consultant Engineer, FM Global**
- Evaluate the seven risk factors when assessing the potential for a failure on a gas turbine
  - Ensure the engineer has loss prevention solutions that can reduce and mitigate the risk of failure
  - Manage the relationships with OEMs or maintenance providers
- 15:50**     **CHALLENGES FOR THE INDUSTRIAL GAS TURBINE**  
**Frank Carchedi, Director of Business Excellence and Quality, Siemens Industrial Turbomachinery**
- Explore the critical technologies used in modern gas turbines
  - Gain a forward view of the future technologies which will continue the performance development while extending fuel capacity
  - How combined heat and power applications can achieve well over 80% cycle efficiency
- 16:20**     **QUESTION AND ANSWER SESSION**
- 16:35**     **CHAIR'S CLOSING REMARKS**
- 16:45**     **END OF CONFERENCE**

**Find out more about our speakers at [www.imeche.org/events/S6199](http://www.imeche.org/events/S6199)**

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- Chris Dometakis, Centrica
- Terry Raddings, GE
- Martyn Adams, E.ON
- Alexander Bill, Alstom

# SPEAKERS AND CONTRIBUTORS

## **CLIVE MOFFATT** KEYNOTE MANAGING CONSULTANT, MOFFATT ASSOCIATES

Clive Moffatt has been at the forefront of many leading developments in the UK and EU energy markets in the last 30 years. Since 1992, he has provided research and consultancy services to both market participants and policymakers. Since September 2010, Clive has been heavily involved in all aspects of the UK Electricity Market Reform (EMR). In particular, he has played a key role in the design and implementation of the new capacity market to promote energy security of supply and greater market competition. In addition, he has advised the Government and Ofgem on the pros and cons of intervening to support the construction of new gas storage facilities in the UK.

## **DAVID GRAHAM** TECHNICAL CONSULTANT, E.ON TECHNOLOGIES

David Graham is a Technical Consultant with E.ON Technologies, working at its Technology Centre near Nottingham. He provides technical support in relation to continuous emissions monitoring, emissions reporting and compliance issues for all plant types. This includes the development of guidance for carbon reporting. Before joining E.ON, David was a gas turbine combustion engineer with Alstom for six years and, prior to that, he worked on various aspects of combustion and environmental science with British Gas. He holds a degree in Chemical Engineering and is currently Chair of the UK Source Testing Association.

## **THOMAS KROGH** PRINCIPAL PROJECT MANAGER, RAMBOLL – ENERGY

Thomas Krogh is a Mechanical Engineer with an MSc from Denmark's Technical University. He has over 25 years of experience in the power generation industry, working at various levels, with the major Danish power utility DONG Energy, which included engineering, O&M and asset management of various types of power station. His international experience stems from projects in Poland, Italy and the UK where he has been involved with the construction and commissioning of power plants. Thomas is now a Principal Project Manager with the Danish Engineering Consultant Ramboll, where he is utilising his vast experience in developing the next generation of engineers and working on innovative power plant designs.

## **JON DOUGLAS** GROUP LEADER MATERIALS PERFORMANCE, FRAZER-NASH CONSULTANCY

Jon Douglas graduated from Imperial College with a PhD in Mechanical Engineering in 1998, where his research resulted in a generalised model for assessing the high-temperature deformation of nickel-based super alloy CMSX-4 under multi-axial stress states. Since then, he has provided consultancy support across a wide range of industries, including the energy sector. For the last five years, Jon has been leading the Materials Performance Group, which develops models of material behaviour and methods for lifting components, particularly in power generation.

## **MIKE WOOD** GAS TURBINE CONSULTANT, EDIF ERA TECHNOLOGY

Mike Wood is a Consultant Metallurgical Engineer with more than 30 years of experience of integrity and durability related issues, covering a wide range of gas turbines from all the major OEMs. He has carried out numerous life assessments for plant operators on turbine components, encompassing primarily turbine blades and discs/rotors. These have extended to risk assessments for operators of in-service units as issues have arisen. Mike has investigated many major failures and near-miss incidents in gas turbine plants to determine their root causes. These have been carried out for operators as well as loss adjusters and insurers.

## **CLIFFORD SMITH** INDEPENDENT ENGINEERING CONSULTANT, CSGT CONSULTANCY

Clifford Smith started his career at Rolls-Royce I&M Division, Ansty. He has over 30 years of experience in the design, maintenance, overhaul and component repair of aero derivative, lightweight and heavyweight industrial gas turbines. Throughout this period he has worked for OEMs, primary sub-contractors, end-users and as a consultant. A key feature of Clifford's work throughout this period has been the development and application of component repair techniques in order to extend component life, thus reducing the cost of gas turbine ownership.

## **ROGER FAIRCLOUGH** PRINCIPAL PROJECT LEADER, JOINING TECHNOLOGIES GROUP, TWI TECHNOLOGY CENTRE (YORKSHIRE)

Roger Fairclough is a Principal Project Leader in the Joining Technologies Group at TWI, based at the Technology Centre in South Yorkshire, and is involved with a range of technologies, in particular Additive Layer Manufacture using lasers. He has over 40 years of experience within the UK engineering industry, having worked in the mining, power generation, R&D and steel manufacturing sectors. Prior to working for TWI, Roger was Chief Engineer for an international company producing nickel super alloys and components for the aerospace and oil & gas industries. Prior to that, he worked as Mechanical Maintenance Engineer at a coal-fired power station.

## **MARCUS SCHOLZ** TECHNICAL DIRECTOR, ADVANCED COMBINED CYCLES, GENERAL ELECTRIC POWER GENERATION

Marcus Scholz has been the Technical Director for Advanced Combined Cycles for General Electric (GE) Power Generation since January 2014. In this role, he oversees the project development activities for F and H-class projects with specific focus on the performance and value proposition. He has been with GE Power Generation for over 15 years and has held various positions, ranging from engineering to sales and BD roles. Prior to joining GE, Marcus worked with European Gas Turbines (UK) for over six years in gas turbine testing, commissioning and gas turbine development, specialising in DLN combustion systems design.

## **ROBERT BROAD** BUSINESS DEVELOPMENT MANAGER, HEATRIC

Robert Broad is the Business Development Manager at Heatric in the UK. He gained a BA in Chemical Engineering from Bath University, and is a Chartered member of the Institute of Chemical Engineers in the UK and also a member of the European Professional Engineers Register. Robert has spent 18 years in the compact heat exchanger industry and has worked in design, product development and commissioning in disparate markets from distillery to oil and gas. He gained an MBA from Henley Management College in 2005.

## **JOHN BOOTH** MAINTENANCE SECTION HEAD, RWE STAYTHORPE POWER STATION

John Booth is a Mechanical Engineer who has spent over 20 years in CCGT maintenance, commissioning and management. He is presently Section Head of Maintenance for RWE Generation UK at Staythorpe 1750MW CCGT power station, which was commissioned in 2010. The site comprises four Alstom GT26 single shaft units and is the sister station to RWE Generations Pembroke 2000MW CCGT, with five GT26 single shaft units. John has worked for RWE since 2006 and prior to that for two other major utility companies at several CCGTs and CHPs. His work has covered areas including new build, mobilisation, commissioning, major overhauls and improvement projects as well as maintenance and operations.

## **SETH MUTHURAMAN** CONDITION MONITORING ENGINEER, SSE

Seth Muthuraman plays an active role in deploying predictive equipment health monitoring modules across the SSE fleet. He has been working in the Equipment Performance Centre for more than seven years. His main area of work is in predictive modelling, particularly applied to gas turbines. He worked at Rolls-Royce on fault detection and diagnostics in the engine health monitoring of jet engines and industrial gas turbines. Seth completed his PhD in developing a novel technique to evolve complex structures in a modular fashion using artificial intelligence techniques. His work has appeared in the New Scientist, Electronics World and major UK headlines.

## **TIM EASTWOOD** BUSINESS DEVELOPMENT DIRECTOR, ALSTOM POWER

Tim Eastwood is a Chartered Director and a Fellow of the Institute of Directors. His career started with GEC Gas Turbines as a Commissioning Engineer on gas turbine power units. In the past 33 years he has worked in the power, oil and gas, mining and minerals and water industries. Today, Tim is responsible for identification and capture of growth opportunities throughout North Europe for Alstom Power Thermal Services.

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24-25 June 2015  
London

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[www.imeche.org/events/S6208](http://www.imeche.org/events/S6208)



9 September 2015  
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### POWER PLANT OPERATIONS AND FLEXIBILITY

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[www.imeche.org/events/S6245](http://www.imeche.org/events/S6245)



22-24 September 2015  
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