BOLTED FLANGED JOINTS: NEW METHODS AND PRACTICES

Institution of MECHANICAL ENGINEERS

16-17 March 2010
Turbine Hall
The CastleGate
Melbourne Street
Newcastle upon Tyne
NE1 2JQ

Book now:
www.imeche.org/events/s1500

THIS SEMINAR WILL COVER:
- Advances in flange design
- Developments in flange and gasket standards
- Gasket and Bolting selection and technology
- Qualification of personnel
- Bolt load management
- Leak management and investigation
- Emissions legislation

Improving the world through engineering

Photo courtesy of Hydratight
The seminar will highlight some of the new methods and practices associated with the design, selection, assembly and maintenance of bolted flanged joints in pressure systems. It will provide information on developments in gasket technology and the changes in EN 1591 code for flange design.

Important issues in the assembly of bolted joints and the main methods of controlled tightening will be addressed. Common errors in both assembly and tightening will be highlighted, and advice given on how these can be avoided.

Case studies and discussion sessions will be included on operations issues and maintenance, including emissions legislation, leak management, investigation and record keeping.

**WHO SHOULD ATTEND?**
- Engineers with an interest in pressure systems
- Specialists involved in onshore and offshore pipelines
- Users and operators of pressure equipment which incorporates bolted flanged joints
- Those involved in health and safety and environmental issues relating to pressure equipment
- Engineers working in process, petrochemical, power generation, oil and gas, including designers, inspection engineers and managers

**BENEFITS OF ATTENDANCE:**
- Learn about the latest advances in European and American technology from renowned international experts
- Examine developments in standards, gasket materials, bolt tightening technology and the qualification of personnel competency
- Study the failure mechanisms for bolted flanged joints
- Appreciate the problems associated with the management of the integrity of bolted joints
- Increase awareness of the requirements of emissions legislation, leak management and investigation and record management
- Avoid problems caused by selection of inappropriate flange type, gasket material or bolting
- Adopt a good-practice management system for bolted joints
- Improve the training and competency of personnel

**Photo courtesy of Hydratight**

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DAY 1
SELECTION AND DESIGN

09:30 REGISTRATION AND REFRESHMENTS

10:00 CHAIRMAN’S WELCOME AND INTRODUCTION

10:10 INTRODUCTION
Robert Noble, Technical Services Leader, Hydratight
- Comparison of the Bolted Joint with the Welded Joint
- The Bolted Joint in the Pressure Equipment Directive
- Changing Standards and guidelines around the bolted Joint

SELECTION:

10:35 FLANGE SELECTION
Dr David Nash, Reader & Vice Dean, University of Strathclyde
Simon Earland, Director, Earland Engineering
- Standard flanges (EN 1092, EN 1759, ASME B16.5 and B16.47)
- Proprietary flanges (Taper-Lok, Grayloc, Verax, etc.)
- Custom designed flanges
- Quick release openings

11:00 Q&A SESSION

11:20 REFRESHMENTS

11:50 GASKET SELECTION
Dr Gavin Smith, Technical Director, Novus Sealing Limited
- A gasket is a relatively low cost item but it is critical to the safe operation of any plant. If it leaks, there is a loss of containment and containment is critical to plant operation
- To ensure safe operation, a gasket must be: Correctly selected, Of the right quality and properly assembled
- The presentation will discuss each of these areas in turn and provide practical guidance on achieving a leak free bolted connection

12:15 BOLT SELECTION
Rod Corbett, Managing Director, James Walker Rotabolt
- The physical and metallurgical properties of key metals/alloying elements and their impact on bolt alloy selection
- Material selection for bolt strength; comparison with relevant bolt standards
- Material selection for high temperature, cryogenic and corrosion resistance applications; medium carbon low alloy steels versus non-ferrous alloys
- Selection criteria for resistance to environmental embrittlement such as stress corrosion cracking, hydrogen and liquid metal
- The impact of bolt alloy selection on the effectiveness of the bolt tightening process

12:40 Q&A SESSION

13:00 LUNCH

DESIGN:

14:00 TRADITIONAL FLANGE DESIGN METHODS
Warren Brown, Principal Engineer, The Equity Engineering Group
- Comparison between the traditional ASME method of flange design and other options
- Shortcomings the ASME design method
- Upcoming ASME design revisions
- Off-Code Improvements to the ASME design method
- Design versus Assembly and Operation: closing the gap

14:25 OVERVIEW OF DEVELOPMENTS IN EN 1591
Manfred Schaaf, AMTEC Services GmbH
- EN 1591-2:2008 Gasket parameters
- DD CEN/TS 1591-3:2007 Calculation method for metal to metal contact type flanged joints
- DD CEN/TS 1591-4:2007 Qualification of personnel competency in the assembly of bolted joints
- EN 1591 worked examples

14:50 Q&A SESSION

15:10 REFRESHMENTS

15:40 FAILURE MECHANISMS OF BOLTED JOINTS - BOLTING ASPECTS
Mr Bill Eccles, Technical Specialist, Bolt Science Limited
- Causes and effects of insufficient bolt preload: Tightening issues, lubrication of bolts, stress relaxation and gasket creep
- Joint movement and the self-loosening of threaded fasteners
- Tensile fracture/overload of bolts
- Fatigue failure of bolts
- Causes of thread stripping

- FLANGE FAILURE FROM THE GASKET VIEWPOINT
Russ Currie, Applications Engineering Manager, Flexitallic
- Failure mechanisms
- Examples of failures with regard to non metallic, semi metallic, and metallic components

16:10 EUROPEAN EMISSIONS LEGISLATION
Dr Brian Ellis, Secretary General, European Sealing Association
- Development of European environmental legislation
- Types of legislation
- Key items of European and national legislation
- Integrated Pollution Prevention and Control Directive
- Latest developments

16:25 DISCUSSION SESSION – DAY 1

16:50 CHAIRMAN’S CLOSING STATEMENT

17:00 EVENING RECEPTION AND EXHIBITION

18:00 CLOSE OF DAY 1
 DAY 2

ASSEMBLY AND OPERATION

09:30 REGISTRATION AND REFRESHMENTS

09:55 CHAIRMAN’S WELCOME

ASSEMBLY OF BOLTED JOINTS:

10:00 BOLT TIGHTENING METHODS AND BOLT LOAD MEASUREMENT
Tony Scrivens, Global Engineering Manager, Hydratight
Rod Corbett, Managing Director, James Walker Rotabolt

Bolted Joint Reliability – the three factors
- The importance of bolt tension/joint compression/gasket seating stress
- Integrity of the stress strain relationship: theory versus practice
- And the factors that affect bolt load measurement integrity and subsequent methodology

Design aspects of bolt load measurement for assured reliability and durability in industrial environments
- Bolt load measurement using air gap technology; a brief overview of the technique and its usage

Additional Speaker: TBC

10:45 MANAGEMENT OF THE INTEGRITY OF BOLTED JOINTS FOR PRESSURISED SYSTEMS
Robert Noble, Technical Services Leader, Hydratight

The Essential Elements of a Management System
- Ownership
- Technology and Practice
- Criticality Assessment
- Training and Competence
- Records, Data Management and Tagging
- In Service Inspection
- Management of Leaks
- Analysis Learning and Improvement

11:30 REFRESHMENTS

11:30 ASME PCC-1
Warren Brown, Principal Engineer, The Equity Engineering Group

Outline of the major changes coming out in ASME PCC-1:2009 “Guidelines for Pressure Boundary Bolted Flange Joint Assembly”, including:
- Appendix A: Training, Qualification and Certification of Joint Assembly Personnel
- Appendix D: Guidelines for Allowable Gasket Contact Surface Flatness and Defect Depth
- Appendix E: Flange Joint Alignment Guidelines
- Appendix F: Alternative Flange Bolt Assembly Patterns
- Appendix M: Hardened Washer Usage Guideline and Purchase Specification
- Appendix N: Reuse of Bolts
- Appendix O: Assembly Bolt Load Selection
- Appendix P: Guidance on Troubleshooting Flanged Joint Leakage Incidents

12:00 QUALIFICATION OF PERSONNEL COMPETENCY – DD CEN/TS 1591-4
John Hoyes, Technical Director Emeritus, Flexitallic Ltd

- Why is Standardisation Necessary
- Off Shore Precedent
- Evolution of a CEN Standard
- Interaction with the Pressure Equipment Directive
- Upgrading of TS 1591 Part 4 to a full EN standard

12:45 Q&A SESSION

13:00 LUNCH

OPERATION:

14:00 A REGULATORY PERSPECTIVE ON BOLTED JOINTS AT HIGH HAZARD SITES
Iain Paterson, Team Leader Mechanical Engineering, HSE Offshore Division

- Relevant legislation covering leaks from flanges at high hazard sites
- A discussion about the EI / Oil & Gas UK guidelines on the management of bolted joints
- Data from HSE’s Hydrocarbon Release Database to show the proportion of leaks from flanged joints and their causes

14:15 LEAK MANAGEMENT AND INVESTIGATION
Ed Versluis, Sales Manager for Holland - Flange Management JW Group, James Walker Rotabolt

- Reliability parameters for bolted joints
- Bolted joint behaviour under thermal cycling
- Heat exchanger leaks - how to avoid?

14:40 Q&A SESSION

15:00 REFRESHMENTS

15:30 CASE STUDIES
Invited Contributions

16:00 DISCUSSION SESSION – DAY 2

16:15 CHAIRMAN’S CLOSING STATEMENT

16:30 EVENT CLOSES

This programme is subject to amendment.
FORWARD THINKING.

If you are interested in any of these events, please contact Jacqui Parker on +44 (0)20 7304 6966 or psg@imeche.org

13 MAY 2010: 1 BIRDCAGE WALK
WHEN THINGS GO WRONG… WHAT HAPPENS NEXT?
The intent of this event is to enable delegates to understand the effect and perspective of a serious pressure incident on those involved, the events and investigation that would follow the incident and lead to a trial, and how the Pressure Systems Safety Regulations interact with other health and safety law.
The seminar will enable owners/users of pressure systems to understand the application of the Pressure Systems Safety Regulations 2000, in the context of the Provision and Use of Work Equipment Regulations 1998, the Health & Safety at Work etc Act 1974 and English Statute & Common Law. The technical benefits may be explained in the context of the developments in personal and corporate liability.
www.imeche.org/events/s1501

29 JUNE 2010: 1 BIRDCAGE WALK
ADVANCED PLANT DESIGN AND ASSESSMENT METHODS
Attend this event to hear about recent advances in design-by-analysis (DBA) methods for the design and assessment of both conventional and nuclear plant to ASME, BS and EN codes. Come and understand what new skills/software are needed to apply these methods and how DBA can reduce fabrication costs and increase plant life. Hear what both practitioners and regulators think about these methods. This event will appeal to engineers designing, procuring and assessing vessels and is an opportunity to see the current state of the art.
www.imeche.org/events/s1502

20 OCTOBER 2010: 1 BIRDCAGE WALK
REI AND NON-INVASIVE MONITORING
By attending this seminar, delegates will gain an understanding of good and best practice in the process of risk-based inspection and non-invasive monitoring. The effectiveness of the RBI approach against more formal methods of inspection will be presented.
www.imeche.org/events/s1503

25 NOVEMBER 2010: ABERDEEN
OFFSHORE PIPELINES: LIFE MANAGEMENT AND FITNESS
Many UK subsea pipelines are many years old and need to be justified for future operation. They can be vulnerable to corrosion, fatigue and mechanical damage from shipping and seabed movement, but some are difficult to inspect, being very long and in deep water. This event will cover topics relevant to integrity management and operation of offshore pipelines.
www.imeche.org/events/s1505

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BOLTED FLANGED JOINTS: 
NEW METHODS AND PRACTICES

One form per person only (forms may be photocopied) 
For added convenience, you can also book online at www.imeche.org/events/s1500

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Membership No ___ Institution
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How did you hear about this event? Direct Mail [ ] Website [ ] Colleague [ ] Other [ ]

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Extra Items

| Invoice Charging (if applicable) | £10.00 | £1.75 | £11.75 |

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Special Requirements

Please inform us of any special requirements ie dietary or access, on the relevant section of this form.

Cancellation

For a refund (minus £25 + VAT admin charge), cancellations must be received at least 14 days prior to the event. Replacement delegates are welcome at any time.

Supporting Organisations

Members of the following organisations can register at our members’ rates: Oil and Gas UK, Hydrotight, EEMUA, TWI, SAEF, European Sealing Association (ESA), Heat Transfer Society, ICPVT, BSI

Venue

This event will be held at The CastleGate, Melbourne Street, Newcastle upon Tyne, NE1 2JQ

Details will be sent upon registration.

Insurance

The organisers do not accept liability for any injuries or losses of any nature incurred by delegates and/or accompanying persons, nor for loss or damage to their luggage and/or personal belongings.

Accommodation

We have arranged special discounted rates at local hotels via the Corporate Team. Our list of hotels will be forwarded upon receipt of your registration and payment.

If you wish to contact the Corporate Team directly, please use the details below and quote ID number 8488BFJ

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Enquiries

For event enquiries please call Jacqui Parker on +44 (0)20 7304 6966 or email psg@imeche.org

For registration enquiries call Tina Churcher on +44 (0)20 7973 1258 or email t_churcher@imeche.org

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