ABOUT THE COURSE
Corrosion is the electrolytic reaction of the material surface with the ambient medium, which leads to erosion or crack formation in the primary material. This is more prevalent with metals. This part of the course will introduce to different types of corrosion and principles of materials. Other lectures will deal with corrosion mitigation and protection and how the corrosion is controlled and managed by corrosion testing and monitoring.and material selection. Finally some case studies of offshore corrosion will be dealt with.

Following a general introduction to fatigue and fracture, with examples of service failures, current and developing fatigue design and assessment methods will be described. The course will go on to explain the importance of crack/flaw analysis in structural design and safety assessment and illuminate its wide range of applicability. It will give a deep understanding of the major results and criteria underpinning modern fracture mechanics, the assumptions behind them and important limitations. Attendees will gain a better understanding of material selection for fatigue and fracture resistance and learn about codified procedures for flaw evaluation

WHO SHOULD ATTEND
Engineers and scientists involved in the design, operation and assessment of both onshore and offshore structures.

COST
The registration fee of the workshop will be £650 + VAT (UK only) which includes course notes and lunches. You should make your own arrangements for accommodation.

PAYMENT
Payments can be made by cheque (made payable to ASRANet Ltd.), cash or bank transfer. Please enquire for details.

VENUE
ASRANet Ltd.
St Georges Building
5 St Vincent Place
Glasgow, G1 2DH
Scotland, UK

NOTE
Please do not make your travel arrangements until you receive an Invoice from us.

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Corrosion and Fatigue

22-23 August 2018
Glasgow, UK

ASRANet

PROGRAMME

Wednesday 22nd August

09.00 - 10.30 Lecture 1: Basic understanding of materials and types of degradation mechanisms relevant to offshore structures.
Dr Steve Paterson

10.30 - 10.45 *Break*

10.45 - 12.15 Lecture 2: Principles of aqueous corrosion, electrochemistry, and the electrochemical series.
Dr Steve Paterson

12.15 - 13.30 *Lunch*

13.30 – 15.00 Lecture 3: Methods for corrosion mitigation and protection, including cathodic protection, coatings, inhibitors and corrosion resistant alloys.
Dr Steve Paterson

15.00 - 15.30 *Break*

15.30 - 17.00 Lecture 4: Corrosion control and management including testing, monitoring and materials selection. Examples of corrosion.in oil and gas production facilities
Dr Steve Paterson

Thursday 23rd August

09.00 - 10.30 Lecture 5: Introduction and S – N Curve
Dr Helena Polezhayeva

10.30 - 10.45 *Break*

10.45 - 12.15 Lecture 6: Effect of Stress Concentration specific to offshore structures
Dr Helena Polezhayeva

12.15 - 13.30 *Lunch*

13.30 - 15.00 Lecture 7: Rules for Fatigue design of Welded Structures, Effects of Random Loads, Mean Stress, Thickness and Material Strength
Dr Helena Polezhayeva

15.00 - 15.30 *Break*

15.30 - 17.00 Lecture 8: Application of Fracture Mechanics and Post Weld Improvement Techniques
Dr Helena Polezhayeva

ABOUT THE LECTURERS:

Dr Helena has more than 30 years' experience, and is internationally recognised as a fatigue expert, specialising in the development of spectral fatigue analysis and fatigue assessment procedures for a wide variety of ship types and offshore structures.
Dr Helena also has expertise in fatigue related consultancy and research including fatigue testing and numerical analysis as well as the development and delivery of fatigue training. Helena was awarded a Royal Society Fellowship in 1994 for her Post-Doctoral research

Dr. Steve Paterson, Ph.D, C.Eng. graduated from Imperial College, London, with a B.Sc (Eng.) and Ph.D in Metallurgy. He joined Shell in 1981 and held various roles related to materials, corrosion and welding in the exploration & production, refining and chemical businesses, and worked in the Netherlands, Malaysia, and Norway. In 1999 he moved to Aberdeen where he was responsible for delivery of inspection and integrity services to Talisman Energy. He rejoined Shell in Aberdeen in 2001 to work on subsea development projects, and in 2006 became head of materials and corrosion engineering for Shell's Upstream businesses in Europe. From March 2014 until his retirement in May 2017 he was Principal Technical Authority for Upstream Materials for Shell, based in Amsterdam. He now works as an independent materials and corrosion adviser with Arbeadie Consultants.

LECTURE INFO

Lecture 1: Principles of materials and corrosion
Structure of materials
Types of corrosion (atmospheric, pitting, crevice, galvanic, microbial, CUI)
Stress corrosion cracking
Hydrogen embrittlement
Impact of corrosion on fatigue

Lecture 2: Principles of aqueous corrosion
Mechanisms of aqueous corrosion
Electrochemistry
Kinetics of corrosion
Passivity
Electrochemical series

Lecture 3: Corrosion mitigation and protection
Cathodic protection: sacrificial/impressed current
Corrosion inhibition
Coatings and fabric maintenance
Corrosion resistant alloys

Lecture 4: Corrosion control and management
Corrosion testing and monitoring
Materials selection and corrosion management
Case studies of offshore corrosion

Lecture 5: Introduction and S-N Curve
Fatigue mechanism of materials
Fatigue mechanism of welded structures
Fatigue design principles
Fatigue damage models
Uncertainties in fatigue damage prediction
Major factors affecting fatigue life
Origin of SN curve & Fatigue test
Segments of SN curve
SN curve for welded structural details

Lecture 6: Effect of Stress Concentration
Introduction and lessons learned from the past
Definition of stress concentration factor (SCF)
Methods for assessing SCF
Stress concentration in hull structural details
Stress concentration at welds
Finite element modelling for SCF

Lecture 7: Rules for Fatigue design of Welded Structures
Fatigue assessment process for hull and offshore structures
Assessment of local stress in structural details for fatigue analysis
Evaluation of hot-spot stress
Secondary stress
Design SN curve
Strain-Life Criterion-based Approach Basics and Application
Local Strain Methodology
Strain Life Cyclic Curves
Strain-Life Criterion for Fatigue
Evaluation of Local Strain Applications

Lecture 8: Application of Fracture Mechanics
Fracture Mechanics: Basic concepts
Fatigue crack propagation
Stress intensity factor
Evaluation of stress intensities
Evaluation of (residual) fatigue life
Fatigue Crack Propagation: Consequences
Welding Improvement Techniques
Loading and Environmental Conditions
Limitations