

# ***SHEFFIELD FRACTURE MECHANICS***

## **PROGRAMME - PART 1**

### **Tuesday**

- 09.00 Welcome and Introduction to each other
- 09.30 Why Fracture Mechanics? Background to Case Study on Failure of a Crane Hook
- 10.00 *Coffee*
- 10.15 Elastic Crack Tip Mechanics
- 11.20 Video – Last of the Liberties
- 11.45 Engineering with  $K$
- 12.45 *Lunch*
- 13.45 LEFM Fracture Examples Tutorial
- 14.30 Toughness Measurement
- 15.15 Video – the  $K_{IC}$  Test
- 15.35 *Tea*
- 15.50 LEFM Toughness Tests and Validation Exercises & examination of test specimens
- 16.30 Why Fracture Mechanics? Case Study to investigate the Failure of a Crane Hook
- 17.30 Why Fracture Mechanics? Debrief on Failure of a Crane Hook
- 17.45 *End of day 1*

### **Wednesday**

- 09.00 Video – Living with Cracks
- 09.20 Cracks in Cylinders and Flat Plates Examples Tutorial
- 09.35 Dinorwig Penstock Static Design and LEFM Assessment Case Study
- 10.35 *Coffee*
- 10.45 Dinorwig Penstock Static Design and LEFM Assessment Case Study - debrief
- 11.00 Plastic Collapse
- 11.45 Plastic Collapse Examples Tutorial
- 12.15 Plasticity at the Crack Tip
- 13.00 *Lunch*
- 14.00 Failure Assessment Diagrams
- 15.00 Failure Assessment Diagrams Examples Tutorial
- 15.45 *Tea*
- 16.00 Dinorwig Penstock EPFM Assessment Case Study
- 17.15 Dinorwig Penstock EPFM Assessment Case Study - debrief
- 17.30 *End of day 2*

### **Thursday**

- 09.00 Micro-mechanisms of Fracture: Why things break in different ways
- 10.00 De-aerator Vessel Case Study
- 10.30 *Coffee*
- 10.45 De-aerator Vessel Case Study
- 11.45 De-aerator Vessel Case Study - debrief
- 12.00 Fatigue
- 13.00 *Lunch*
- 14.00 Fatigue Examples Tutorial
- 15.00 Dinorwig Penstock Fatigue Assessment Case Study
- 15.30 *Tea*
- 15.45 Dinorwig Penstock Fatigue Assessment Case Study - continued
- 16.15 Dinorwig Penstock Fatigue Assessment Case Study - debrief
- 16.30 *End of Part 1*

## ***SHEFFIELD FRACTURE MECHANICS*** **PROGRAMME - PART 2**

### **Tuesday**

- 09.00 Lusaka Aircraft Tailplane Failure Case Study
- 10.30 *Coffee*
- 10.45 Lusaka Aircraft Tailplane Failure Case Study - debrief
- 11.00 Resistance Curves
- 11.45 Resistance Curves Examples Tutorial
- 12.45 *Lunch*
- 13.45 Airbus Wing Design: Case Study
- 15.45 *Tea*
- 16.00 Airbus Wing Design Case Study - debrief
- 16.15 Environment Assisted Fracture
- 17.15 Video – Stress Corrosion Cracking in aircraft centre-section forging
- 17.30 *End of day 4*

### **Wednesday**

- 09.00 Environmental Influences Examples Tutorial
- 09.30 Elastic-Plastic Fracture Mechanics
- 10.15 Familiarisation with  $J$  Examples Tutorial
- 10.45 *Coffee*
- 11.00  $J$  and CTOD Testing
- 11.45  $J$  Toughness Determination Group Exercise
- 12.45 *Lunch*
- 13.45 Material Specific  $J$  and Failure Assessment Curves
- 14.45 Pipeline Bending Case Study:  $J$  Estimation
- 16.00 *Tea*
- 16.15 Numerical Methods
- 17.00 Numerical Methods Exercise
- 17.45 *End of day 5*
- 19.30 *Course Dinner*

### **Thursday**

- 09.00 Combining Primary and Secondary Stresses
- 09.45 Combining Primary and Secondary Stresses Exercise
- 10.30 *Coffee*
- 10.45 Defect Assessment Procedures
- 11.30 R6 Examples Tutorial
- 12.00 Pipeline Bending Case Study: Assessments Including Weld Residual Stress
- 12.45 *Lunch*
- 13.45 Reactor Coolant Pump Casing Case Study
- 15.10 Reactor Coolant Pump Casing Case Study - debrief
- 15.30 *End of course & Tea*