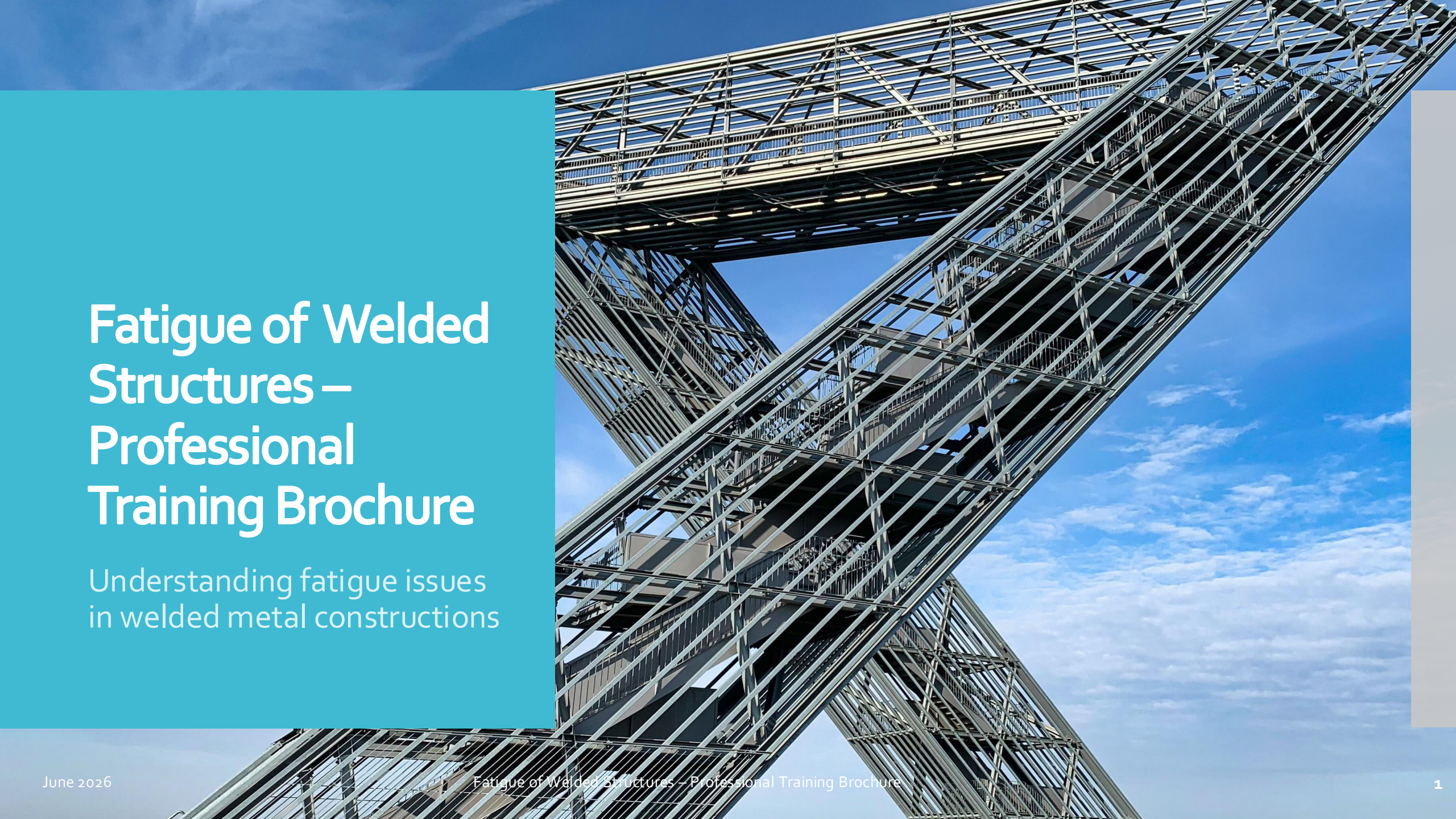
Fatigue of Welded Structures – Professional Training Brochure

Understanding fatigue issues in welded metal constructions



Training Programme Overview

Introduction to the Programme

Programme Purpose
Provides engineers with practical understanding of fatigue in welded structures for real-world applications.

Core Pillars
Focus on industry standards, practical fatigue theory, and expert-led instruction for applied learning.

Intended Outcomes
Enhanced competence in fatigue risk identification, assessments, and informed decision-making to improve safety.

Programme Scope
Covers fundamentals to advanced structural integrity assessments in a structured learning path.

Why This Programme

Industry Standards Alignment

The programme aligns with BS 7608 principles, ensuring content relevance to industry standards and professional use.

Theory to Practice

Bridges theory and real-world application through practical examples and case studies for engineering solutions.

Focus on Engineering Judgment

Encourages decision-making skills considering uncertainty and real-world constraints beyond calculations.

Expert-led Training

Delivered by a recognised expert in fatigue and fracture mechanics, adding credibility and depth to learning.

Overview of Fatigue in Engineering

Fatigue Failure Causes

Fatigue failures occur from cyclic loading causing crack initiation and propagation in welded structures.

Industry Impact

Fatigue impacts infrastructure, offshore energy, transportation, and industrial equipment sectors significantly.

Design and Assessment Challenges

Misunderstanding fatigue leads to costly failures; practical standards interpretation is essential.

Training Programme Focus

The programme covers fundamental to advanced fatigue assessment techniques for reliable design.

Target Audience

Engineering Professionals
Design and structural engineers focus on safety and performance of welded structures.

Fatigue and Integrity Specialists
Specialists perform advanced assessments to evaluate structural fatigue and integrity.

Asset Owners and Operators
Owners and operators use fatigue knowledge to manage risk and maintenance effectively.

Consultants and Legal Professionals
Consultants provide expert advice; legal experts benefit from failure mechanism insights.

Level 1 – Fatigue Fundamentals

Fatigue Failure Mechanisms

Focuses on crack initiation and propagation under cyclic loading as key fatigue failure mechanisms.

S–N Behaviour Concept

Explains the stress range versus fatigue life relationship and its application in engineering practice.

Welded Joints and Stress Concentrations

Highlights how geometric discontinuities and stress concentrations in welds influence fatigue performance.

Fatigue Failure Identification

Covers methods for identifying fatigue failures via visual inspection and fracture surface analysis.

Level 2 – Design and Assessment to BS 7608

Fatigue Assessment Procedure

Level 2 covers the fatigue assessment procedure following BS 7608, focusing on practical application in engineering.

Weld Detail Classification

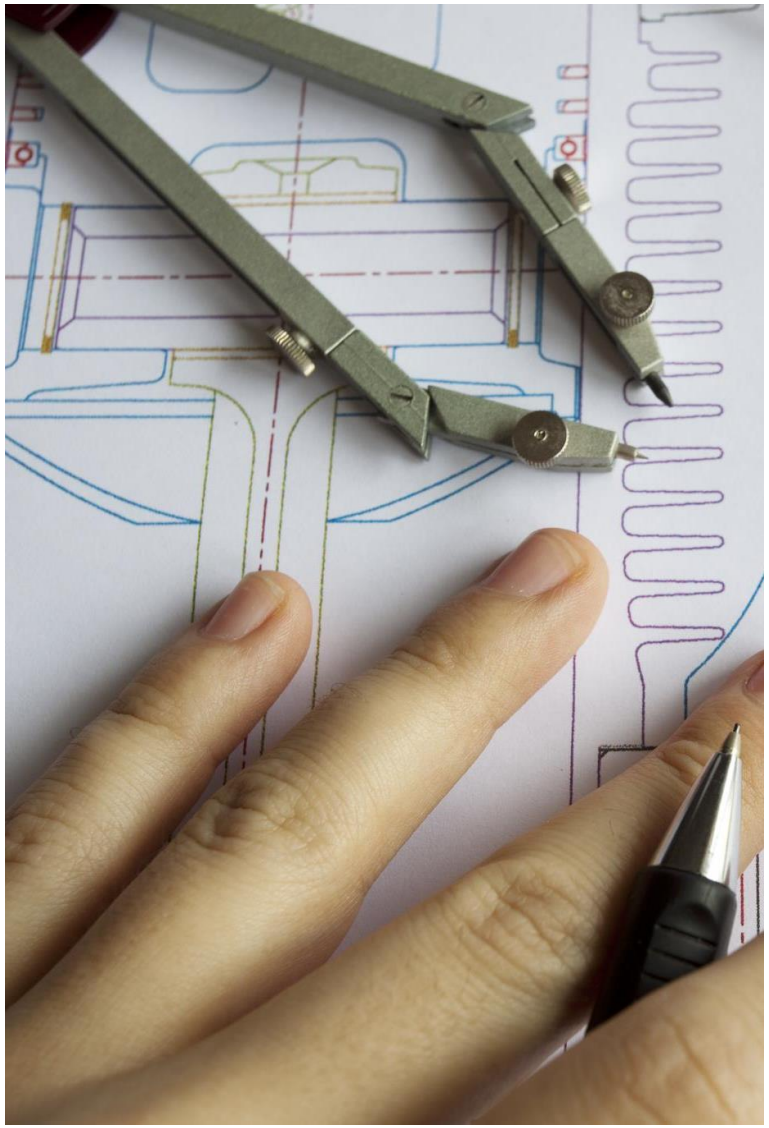
Participants learn to classify weld details accurately to predict fatigue life using appropriate S-N curves.

Application of S–N Curves

The course explains how to apply S–N curves to determine stress ranges and estimate fatigue life of welded components.

Practical Worked Examples

Worked examples demonstrate real-world fatigue assessments, enhancing confidence in using BS 7608 standards.



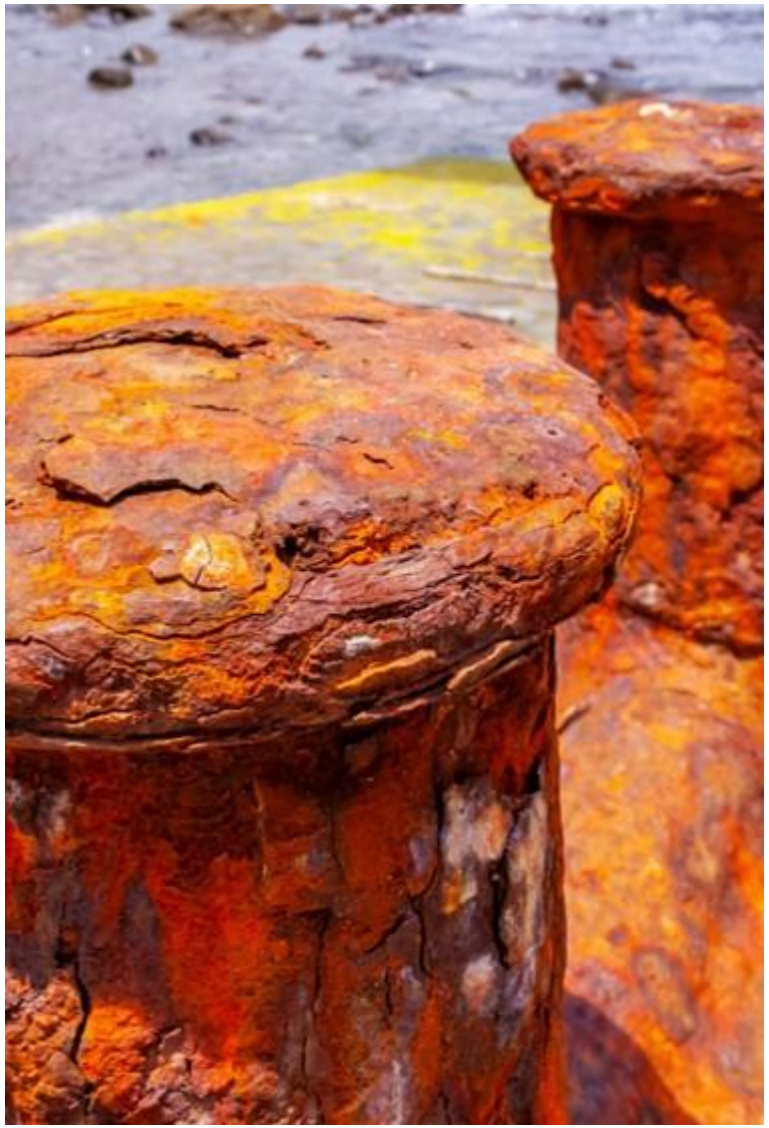
Level 3 – Advanced Fatigue and Structural Integrity

Variable Amplitude Loading Challenges
Variable amplitude loading introduces complexity in predicting fatigue life under changing stress conditions.

Residual Stress and Environment Effects
Residual stress and environmental factors significantly influence fatigue performance and structural integrity.

Fracture Mechanics and Crack Growth
Crack growth analysis offers detailed understanding of crack propagation leading to structural failure.

Engineering Critical Assessment (ECA)
ECA evaluates flaw significance to decide acceptability within structural components.



Masterclass – Expert Applications

Real-World Fatigue Failures

Case studies highlight practical failures and critical lessons learned from real fatigue incidents.

Failure Investigation Techniques

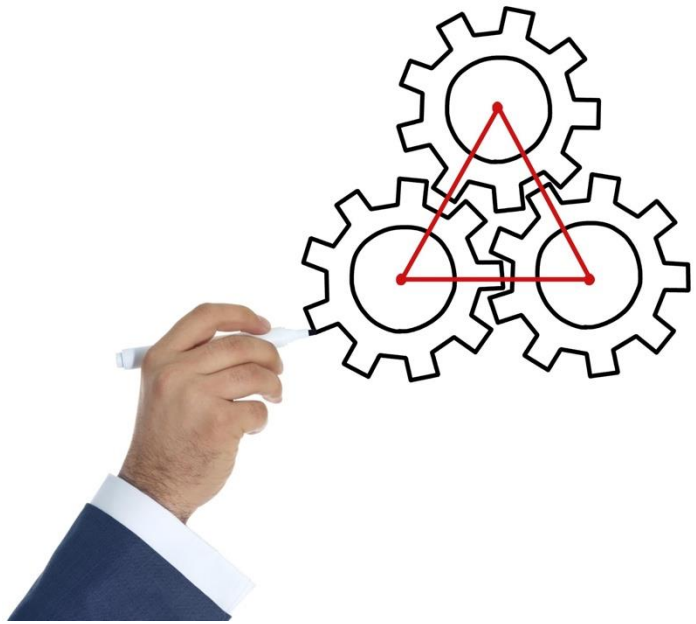
Techniques for investigating causes of failure are essential for accurate fatigue assessment and solutions.

Expert Witness Perspective

Understanding how engineering evidence is presented in legal contexts benefits consultants and professionals.

Application in High-Stakes Situations

Masterclass fosters advanced skills to apply fatigue knowledge in complex, high-impact engineering decisions.



Pricing

In-company training – Fixed fee

Level	Title	Duration, days	Price*, £
1	Fatigue fundamentals	1	4,500
2	Design & assessment to BS 7608	2	9,500
3	Advanced fatigue & structural integrity	2	10,500
3+	Masterclass – Expert applications	1	5,000

* Prices are excluding VAT

Includes:

- Delivery for up to 12-15 delegates
- Tailoring to client industries or failure cases

Bespoke & specialist workshops (POA) may include:

- Project specific fatigue assessments
- Integration with BS 7910 / Structural integrity workflows

Delivery Options and CPD

Flexible Delivery Methods

The course is available via in-company bespoke training, and project-specific workshops to suit organizational needs.

CPD Professional Recognition

Training aligns with Continuing Professional Development, allowing participants to record CPD hours for credential maintenance.

Practical Training Benefits

The programme enhances competence in fatigue assessment and supports informed engineering decision-making.

Contact and Next Steps

Matthew Doré Ph.D CEng FWeldI AMICE

Course Director

E: mdore@exponent.com

T: +44 (0) 20 7864 9755

M: +44 (0) 7880 505 536