

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

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

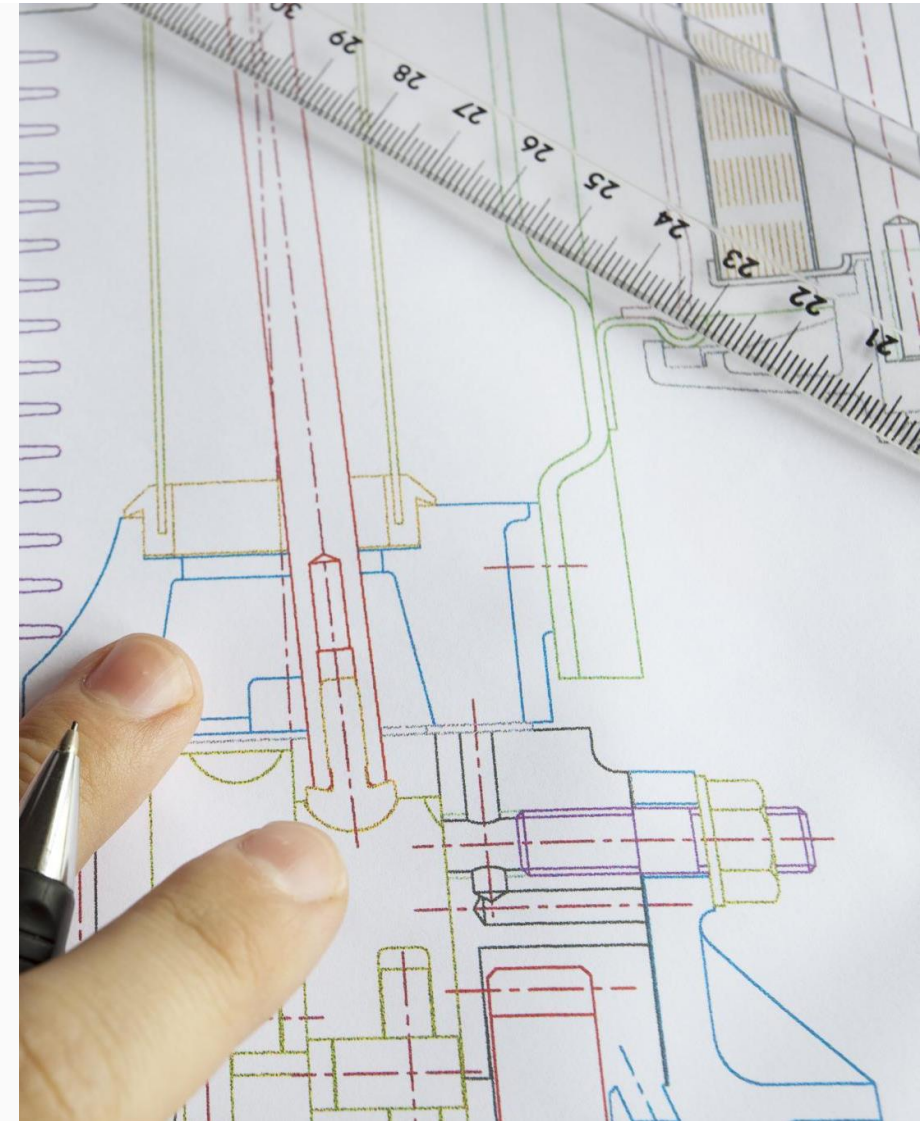
Participants learn to classify weld details accurately to predict fatigue life using appropriate S-N curves.

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

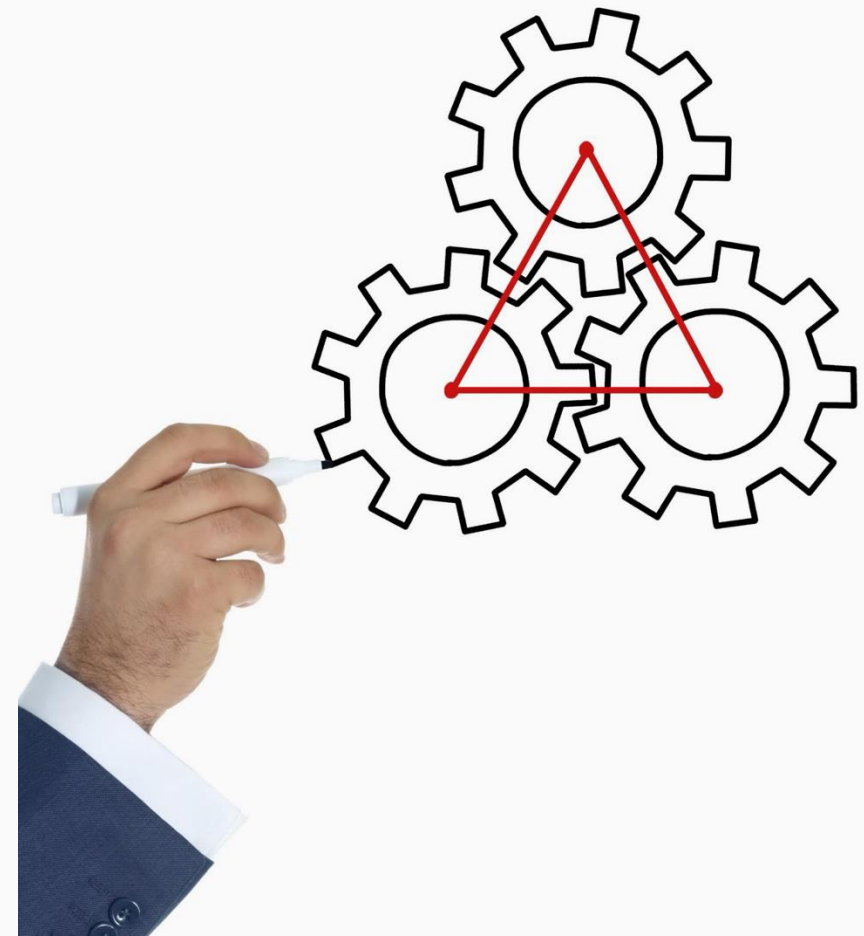
Case studies highlight practical failures and critical lessons learned from real fatigue incidents.

Failure Investigation Techniques

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

Application in High-Stakes Situations

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



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) 7780 505 536

About the Instructor

A chartered engineer with deep industry experience of BS 7910 and BS 7608 fatigue and fracture assessment, applied to welded pipelines, pressure equipment, construction, and offshore structures. Has developed and delivered training on the same standards to assessors, integrity teams, and consulting engineers.

Next Steps

Enquire about scheduling for your team, tailoring to project specific fatigue assessments, and pricing for the 3 levels plus Masterclass extension.

- 1 Book a discovery call**
to scope a bespoke workshop for your team.
- 2 Request the detailed syllabus**
and a sample worked-example workbook.
- 3 Discuss integration**
with BS 7608 fatigue design or your in-house ECA workflow.

About Exponent

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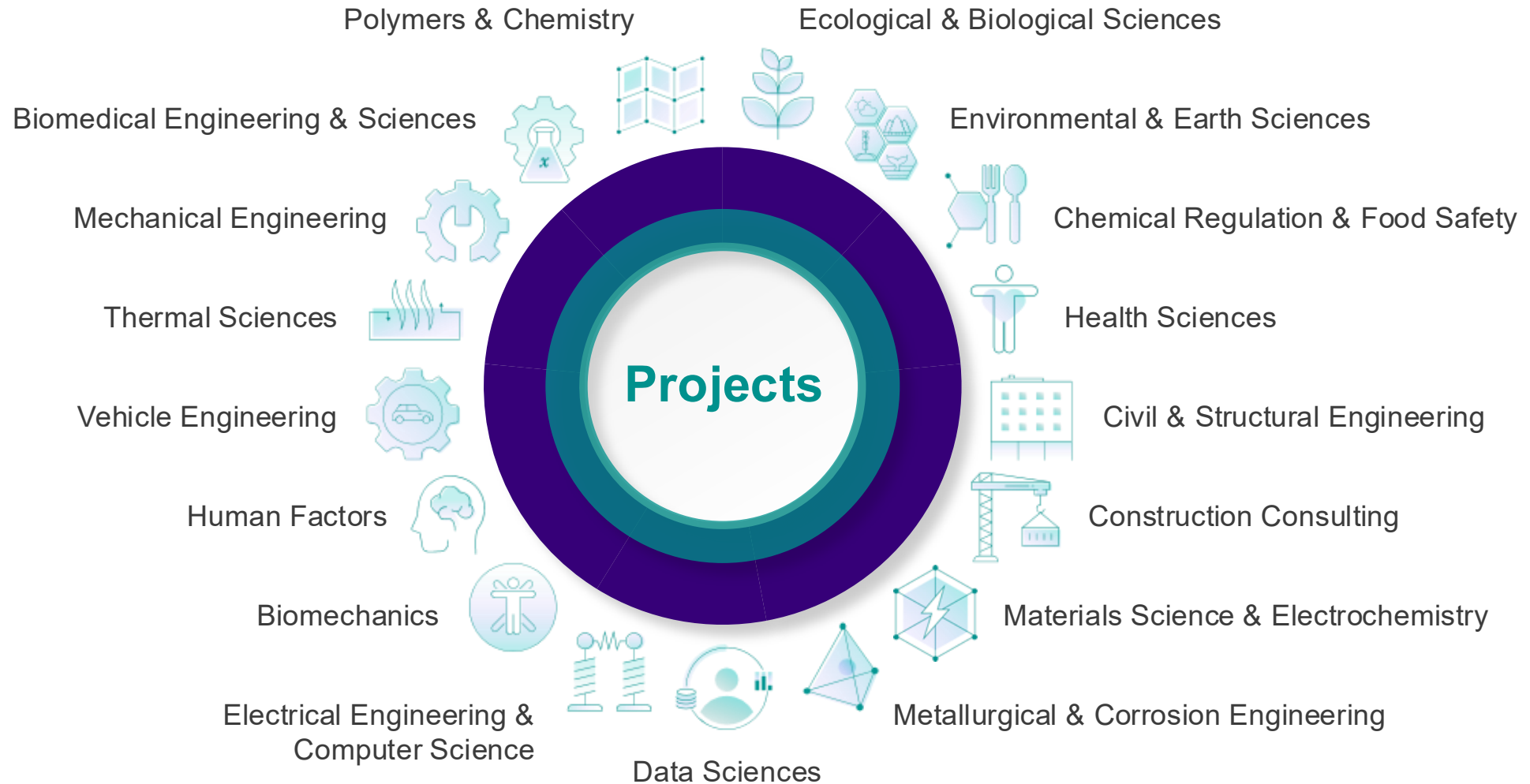
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