Practical Application of BS 7910 – Professional Training Brochure

Engineering critical assessment of welded structures

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Training Programme Overview

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Introduction to the Programme

Programme Purpose

Equips engineers with the practical skills to apply BS 7910:2019 to real fitness-for-service assessments of welded structures.

Core Pillars

Alignment with BS 7910 clauses and annexes, hand-calculation first before software, and expert-led instruction with worked industry examples.

Intended Outcomes

Delegates select the correct assessment route, qualify their inputs, and produce a defensible, compliant ECA report.

Programme Scope

A structured, modular pathway from fracture-mechanics fundamentals through FAD assessment, fatigue, and sector-specific annexes.

Why This Programme

Aligned with BS 7910:2019

Content follows the fourth edition clause-by-clause, so every technique taught maps to the standard engineers already use in practice.

Concept → Clause → Calculation

Each module walks from the underlying mechanics through the standard's procedure, into a hand-calculated worked example and delegate exercise.

Engineering Judgement Focus

Emphasises method selection, input qualification and sensitivity, the decisions that separate a compliant ECA from a defensible one.

Expert-Led Delivery

Delivered by a chartered engineer with deep experience of BS 7910 and BS 7608 fatigue and fracture assessment in industry.

What is an ECA?

Fitness-for-Service Philosophy

Engineering Critical Assessment evaluates whether known or postulated flaws are acceptable for continued service, not simply whether they meet workmanship acceptance limits.

The Assessment Framework

BS 7910 provides tiered methods — fracture Options 1/2/3 and fatigue via fracture-mechanics or quality-category routes — supported by a large body of informative annexes.

Where BS 7910 Sits

Complements design codes and BS 7608 fatigue design; integrates with the integrity-management algorithm for the procedure for flaws and the reporting checklist.

Why It Matters

Correctly applied, an ECA justifies continued operation, informs inspection intervals and supports repair/replace decisions on safety-critical assets.

Target Audience

Engineers New to ECA

The Fundamentals track builds the fracture-mechanics and fatigue background needed before entering the application modules.

Practising Assessors

Experienced engineers refresh best practice on FAD options, residual stress, misalignment, sensitivity and reporting.

Integrity & Inspection Teams

Asset owners, inspection engineers, and integrity managers translate NDT findings into defensible fitness-for-service decisions.

Consultants & Experts

Consultants and technical experts strengthen their command of BS 7910 for advisory, dispute, and litigation work.

Day 1 — Foundations & Inputs

M0 — Scope & Framework

The ECA philosophy, integrity-management algorithm, and the sequence of assessment, with reporting introduced up front.

M1 — Fundamentals Refresher

LEFM, EPFM, K, CTOD, and J; Paris law $da/dN = A(\Delta K)^m$; residual stress and the two-parameter fracture/plastic-collapse rationale for the FAD.

M2 — Flaw Characterization

Planar, non-planar, and shape imperfections; idealisation, interaction, and recharacterization rules.

M3 — Input Data & Stresses

Assembling the information required for assessment checklist; linearizing through-wall stresses into Pm + Pb; resolving primary vs. secondary stress at welds.

Day 2 — Fracture Assessment

M4 — FAD & Option 1

The 14-step procedure; Kr vs. Lr; the assessment line and Lr(max) cut-off; full worked Option 1 assessment of a weld-toe flaw.

M5 — Options 2 & 3, Tearing

Material-specific Option 2 FAD from the stress-strain curve; Option 3 numerical/J-based FAD; ductile tearing credit and its limits.

M6 — Toughness & Tensile Data

Statistical treatment of Kmat using MOTE; Charpy correlations and their limits; sampling weld metal, HAZ, and fusion line.

M7 — Welded-Joint Specifics

Residual-stress profiles, misalignment km factors, strength mismatch, and constraint relaxation.

Day 3 — Fatigue & Closing Out

M8 — Fracture-Mechanics Route

Paris-law integration for known flaws; recommended da/dN laws for steels in air and marine environments; threshold ΔK_0 and Mk.

M9 — Quality-Category Route

The family of quality-category S-N curves; mapping to BS 7608 detail classes; deriving ECA-based fabrication acceptance limits.

M10 — SIF & Reference Stress

Selecting from solutions for plates, cylinders, and shells; Mm, Mb, and Mk magnification; iterating to tolerable flaw sizes.

M11 — Reporting & Sensitivity

Compliant reporting; deterministic sensitivity analysis; partial safety factors and probabilistic methods.

Day 4 — Advanced & Capstone

M12A — Creep & Sector Modes

Creep exemption and the 13-step high-temperature procedure; other modes, plastic collapse, leakage, SCC, corrosion fatigue, and buckling.

M12B — Sector Annexes

Selectable streams for tubular offshore joints, pressure equipment and pipelines, leak-before-break, and locally thinned areas.

M13 — Integrated Capstone

A realistic case study, e.g., an as-welded girth weld or offshore tubular joint, carried end-to-end from NDT characterization through FAD, fatigue to report.

Small-Team Debrief

Delivered in delegate teams with instructor-led comparison of approaches; optionally repeated using assessment software to validate hand calculations.

Delivery Options and CPD

Flexible Delivery Methods

Offered as in-company classroom courses at the client site, as tailored 3- or 4-day formats, and as project-specific workshops focused on the delegates' own assets.

CPD Professional Recognition

Hours count toward Continuing Professional Development for chartered and incorporated engineers; a certificate of completion mapped to the eight learning outcomes is issued.

Assessment & Certification

Short knowledge checks per module, graded worked exercises, and an optional capstone assessment marked against a competency rubric for method selection, calculation, and reporting.

Hand-Calculation First

Delegates work every technique by hand before commercial ECA software is introduced, so they understand what the tool is doing and can defend its outputs.

Contact and Next Steps

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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 specific in-service cases, and pricing for the 3-day core or extended 4-day advanced format.

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

Exponent is the only premium engineering and scientific consulting firm with the depth and breadth of expertise to solve our clients' most profoundly unique and urgent challenges.

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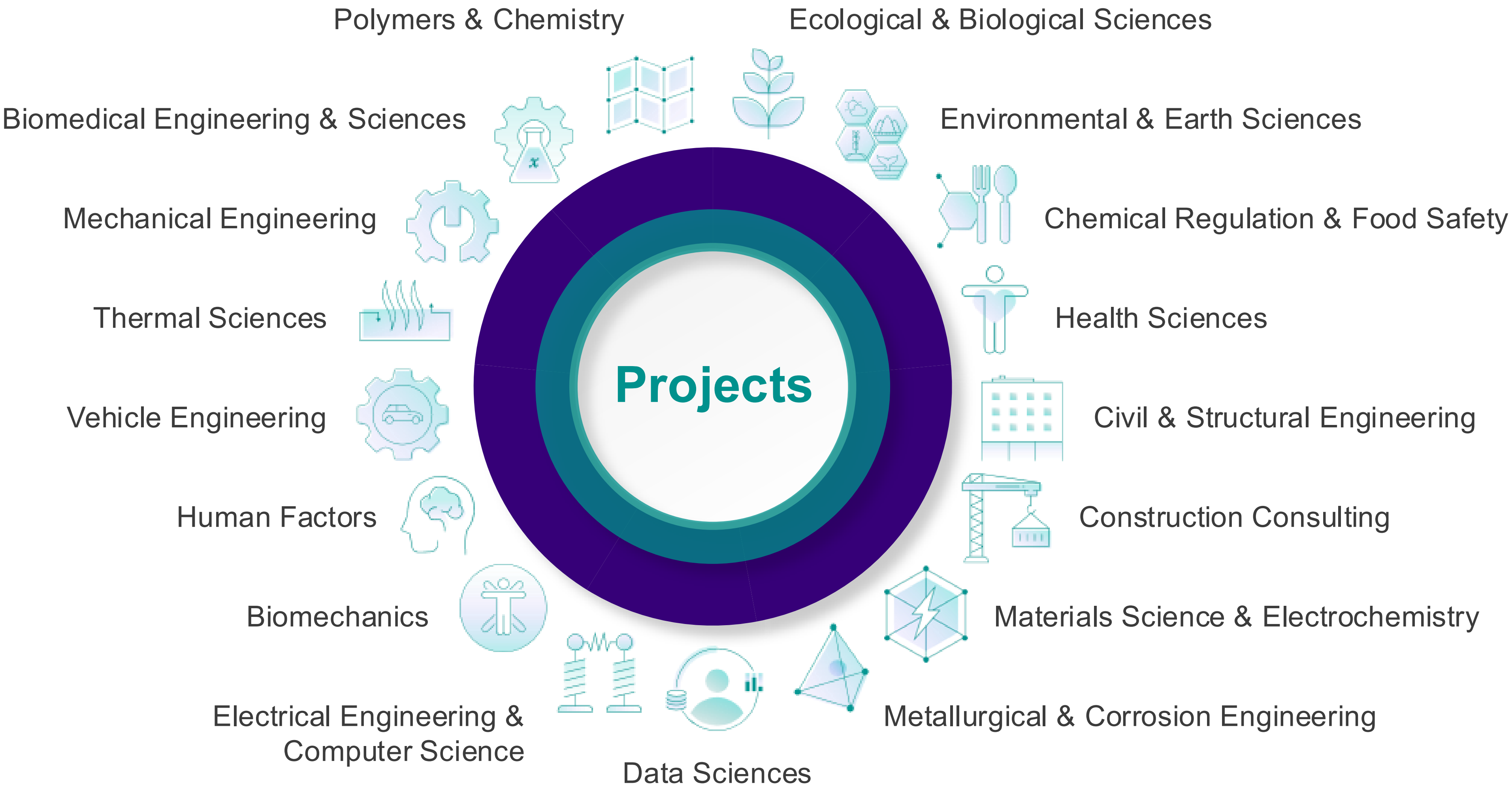

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