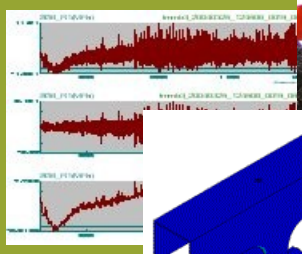
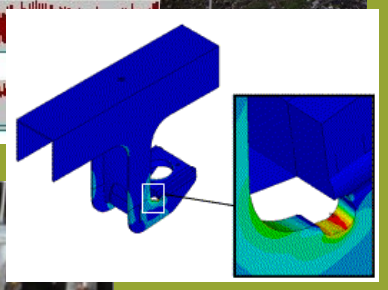
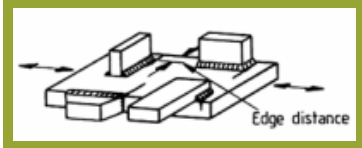
“Railway Vehicle Structural Integrity”

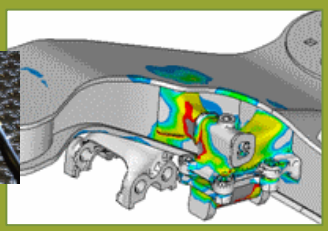
In-house seminars for rail professionals.

Customisable content - 1 to 5 days duration.









WHY ENROL ON THIS COURSE? A structural integrity issue on a railway vehicle impinges on train availably and train safety but in an extreme case it can ground a whole fleet or worse cause a rail catastrophe. This course provides an ideal opportunity to reconnect with engineering principles and root causes of structural problems. With an emphasis on service provision and maintenance, engineering theory is set in the context of real life case studies to reveal management strategies for successful outcomes.

- Understand material failures.
- Finding clues in failure surfaces.
- Dealing with cracks in a vehicle.
- Develop an eye for bad welds.
- Ensure underframe equipment stays attached.
- How to stop bolts breaking or coming loose.
- Understand dynamic loads, vibration and shake tables.
- Avoid failure modes of common components.
- Using lightweight honeycomb materials.
- Include steel and aluminium design.
- Avoid compromising vehicle crashworthiness.
- Introducing structural modifications.
- How to repair damaged vehicles.
- Leading forensic investigations.
- Understanding finite element analysis.
- Life extension of railway vehicles.
- When to use on-track test methods.
- Assessing and monitoring technical risk.
- Risk mitigation techniques.

WHO SHOULD ATTEND? Maintenance engineers, fleet managers and train designers. Previously this course delivered a 30% - 40% increase in confidence in tackling structural issues across all levels of ability.

COURSE LEADER: John Doyle BSc(Eng)., C.Eng., MIMechE., ACGI was born in 1965 and is a graduate of London’s Imperial College with almost 30 years of experience in solving engineering problems. After rising to the position of Chief Mechanical Engineer with Bombardier Transportation he started his own engineering consultancy in 1995 called MoreVision. It specialises in engineering analysis of railway vehicles and mechanical equipment. His website delivers solutions to engineering problems and welcomes over 20,000 unique visitors per month.

Email John.Doyle@morevision.co.uk or call +44 113 8152220 to discuss.

See more details on http://www.excelcalcs.com/training/

ExcelCalcs Railway Vehicle Structural Integrity Course Modules

Weld Strength (½ day)

Start with simplest weld types. Understand basic calculation principles and allowable stress. Use traditional hand calculation methods.

Guide for weld sizing

Guide to determine weld ultimate strength

Weld strength problems.

Beams and Frames (½ day)

Calculating bending stress and deflections.

Guide for section property calculations.

Guide for beam calculations.

Guide for torsion calculations.

Guide for frame calculations.

Fracture Surfaces (½ day)

Reading a fracture surface: Ductile and brittle? High load or low load? Static strength or fatigue strength? Type of load application?

Guide for principle stresses, maximum shear stress, stress intensity, Mohr's circle & failure criteria for ductile and brittle materials.

Examining Fracture surfaces

Bolts (½ day)

Why bolt pretension is so important. How the tightening method controls preload. What can go wrong with a bolted joint? Understanding bolted joint diagrams. Differences bolting steel and aluminium. Preload fatigue benefits. Special bolting products.

Guide to bolted joints design.

Guide assessment of bolt groups.

Bolt quiz.

Safe Life Fatigue (½ day)

Stress Life Fatigue calculations for un-welded items. Damage tolerant or Safe Life? Size Factor, Surface finish, Surface finish factor, Probability of survival factor, Miscellaneous Factor, Stress concentration factor, Notch sensitivity, Mean Stress, residual stress. Assumptions, limitations and advantages.

Guide for constructing a safe life SN diagram.

Guides for stress concentration factors.

Safe life fatigue quiz

Fracture mechanics the life cycle of a crack. Fast fracture or grow? Assumptions, limitations and advantages.

Guide for fracture mechanics calculations.

Dynamics (½ day)

Design for vibration, impact and crashworthiness.

Guide for generalised motion.

Guide for forced vibration.

Fatigue of Welds (½ day)

Putting the analysis the context of the whole engineering process. Stress concentration, materials flaws and residual stresses. Assumptions, limitations and advantages.

Weld stress concentration quiz.

Guide for Fatigue calculations.

Fatigue calculation quiz.

Metallurgical assessment of weld fatigue.

Guide for comparison of international codes EC3, BS7608, AISC, AWS and AASHTO.

Fatigue Enhancement.

Links and Mechanisms (½ day)

Geometry and force solutions.

Guide for pins and lugs.

Guide for excavator design.

Miscellaneous Topics (½ day)

Strain gauges test demonstration.

Guide for wear calculations.

Guide for composite beams and sheets.

Guide for helical spring design.

Guide for interference fits.

Guide for tension connections

Excel Skills for Engineers (½ day)

Throughout the course you'll be exposed to XLC, the good calculations principles and Excel tricks and tips.

ExcelCalcs provides solutions in Excel format so that it can be easily customised and adapted to your particular problem. Each Excel solution comes complete with version histories, user ratings and discussion areas with the calculation author and an expert community. Links to course materials hosted on the www.ExcelCalcs.com site can be found below. Each link includes a description (sometimes with an accompanying video) and preview of the spreadsheet calculation. We'll be covering a lot of ground but the course leader will explain of underlying engineering principles and show its relevance by reference to real-life case studies. There will be quizzes at the end of each module to monitor your progress and certificates of completion will be awarded at the end of the course.

Average Rating	**www.ExcelCalcs.com** Repository Download
★★★★☆	Quick and Dirty Bolt Sizing Calculation.xls. File version 1.1.
★★★★★	Detailed Bolted Joint Calculations.xls. File version 1.1.
★★★★★	Ultimate shear capacity of bolt group.xls. File version 1.0.
★★★★★	BOLTGRP.xls. File version 2.8.
★★★★★	PRYING9.xls. File version 2.0.
★★★★☆	Thread Stripping.xls. File version 01.
★★★★★	Screwjack effects of wear on thread stripping load. File version 1.0.
★★★★★	Biaxial Stress Assessment.xls. File version 1.1.
★★★★☆	SCF circular shaft with keyseat.xlsx. File version 1.0.
★★★☆☆	Residual Stress.xls. File version 1.0.
★★★★★	Central Elliptical hole in a member of rectangular cross section - axial tension.xls. File version 1.1.
★★★☆☆	Plate Stress to Fillet Weld Stress. File version 1.1.
★★★★☆	Plate Stress to Partial Penetration Fillet Weld Stress. File version 1.1.
★★★★★	Ultimate Strength of Weld Groups.xls. File version 1.0.
★★★★★	WELDGRP.xls. File version 2.3.
★★★★★	WELDGRP Metric.xls. File version 1.0.
★★★★★	LineSec.xls. File version 1.1.
★★★★★	Pin and Lug.xls. File version 1.3.
★★★★★	Pin and Lug - Static and Fatigue.xls. File version 1.3.
★★★★☆	Clevis and lug design - Peterson's. File version 1.2.
★★★★☆	Shaft Impact Calculation. File version 1.0.
★★★★☆	Stress Concentration Factor on Circular Shaft Under Bending.xls. File version 1.0.
★★★★☆	BEAMANAL (metric).xls. File version 1.1.
★★★★☆	BEAMANAL.xls. File version 2.5.

Average Rating	**www.ExcelCalcs.com** Repository Download
★★★★★	CurvedBeams.xls. File version 1.1.
★★★★☆	TORSION9.xls. File version 1.0.
★★★★☆	Light-weight Composite Beam Design. File version 1.1.
★★★★★	ExcelFEM_2D (for Excel 2003).. File version 1.3.
★★★★★	ExcelFEM_2D (for Excel 2007 & Excel 2010). File version 1.1.
★★★★★	ExcelFEM_3D (for Excel 2003). File version 1.5.
★★★★★	ExcelFEM_3D (for Excel 2007 & Excel 2010). File version 1.2.
★★★★★	Fracture and Fatigue Calculator.xls. File version 1.0.
★★★★★	Juvinall's Fatigue Life Method.xls. File version 1.0.
★★★★☆	Surface Finish Fatigue Reduction.xls. File version 1.0.
★★★★☆	Petrersons Notch Sensitivity Calculation.xls. File version 1.0.
★★★★★	Fast Fracture - Plate with an Edge Crack.xls. File version 1.0.
★★★☆☆	Crane Designer's Fatigue Design. File version 1.0.
★★★★★	Stress Life Fatigue.xls. File version 1.1.
★★★★★	Roymech's Fatigue Calculator. File version 1.0.
★★★★★	EC3 Fatigue Damage in Steel Welds.xls. File version 1.0.
★★★★☆	Fatigue Damage in Steel Welds.xls. File version 1.0.
★★★★★	Fatigue Damage in Aluminium Welds.xls. File version 1.1.
★★★★☆	External Flow Over Cylinder.xls. File version 1.1.
★★★★☆	Composite Panel Calculations.xlsx. File version 1.1.
★★★★★	Helical Spring Design Guide.xls. File version 1.0.
★★★★★	Interference Fit Joints.xls. File version 1.0.
★★★★★	Adhesive Wear Rate Between Two Metals. File version 1.0.
★★★★★	Generalised Motion Solver.xls. File version 1.0.
★★★★☆	SemiCircular Tension Fitting.xls. File version 1.0.
★★★★☆	Angle type tension fitting.xls. File version 1.0.

Average Rating	**www.ExcelCalcs.com** Repository Download
★★★★☆	 Channel type tension fitting.xls. File version 1.0.
★★★★★	 Excavator Arm.xls. File version 1.0.
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★★★☆☆	 Bonded Lap Joint.xls. File version 1.0.
★★★☆☆	 Forced Vibration of a single degree of freedom system.xls. File version 1.0.
★★★★★	 Contact Stress Sphere.xls. File version 1.0.
★★★★☆	 Dimensional Tolerances ISO 286-2. File version 1.0.
★★★★★	 XLC addin for MS Excel. File version 12.02.01.
★★★★☆	 ExcelCalcs Calculation Template. File version 1.4.
★★★★☆	 True Stress Strain Curve Generation. File version 1.1.
★★★★★	 Material Selection in Mechanical Design.xls. File version 1.0.
★★★★★	 True Stress True Strain.xls. File version 1.0.