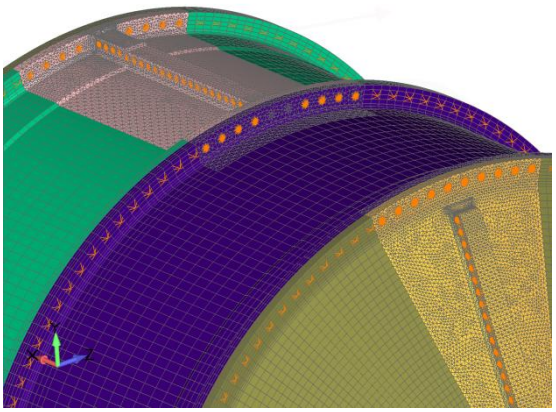
Practical FEA for Engineers and Managers

Prospective attendees:

Rotating stress-range fatigue model with pre-loaded bolts, contact and friction.



Beginner through to advanced-intermediate FEA users who would like to upgrade their depth and confidence in successfully applying simulation to engineering challenges.

Engineering managers who wish to upgrade and/or formalise the techniques used to assess and diagnose their team's analysis activities.

Contract/Project managers who need to better understand or formally audit outsourced analysis projects.

Anyone who needs to understand realistic interpretation and appropriate healthy caution of FEA results and assumptions.

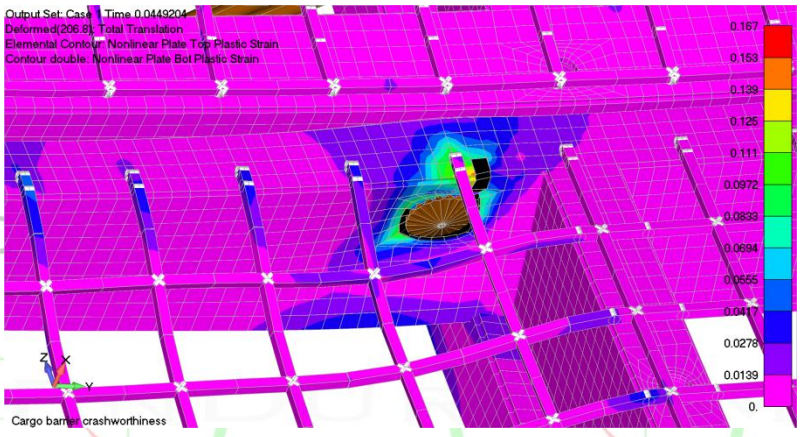
Key value:

- This course is useful for anyone who requires a solid practical working knowledge of Finite Element Analysis and how it can be successfully applied, reviewed or assessed in a real engineering environment.
- The course content draws on decades of industry experience, to help users and managers understand key principles of successful FEA. Given the advancements in both ease-of-use and functional depth of FEA technology - where the options for getting models right or wrong are both increased - the ability to filter reliable knowledge from FEA data is worthwhile .
- By the end of the course, attendees will have a comprehensive understanding of how to approach, improve or audit simulation projects with respect to assumptions, input, technique, model detail, results interpretation and expected outcomes.
- Industry examples are used to clearly illustrate key concepts and examples. This course does not focus on functions and features of specific software, and is relevant to quality analysis using any general purpose mechanical/ structural/ thermal FEA package.
  (Specific Femap/Nastran training is detailed here).
- Every course day saves each attendee weeks of self-learning. Likewise, it minimises the potential for costly FEA errors, before they occur.
- This training is an essential component for those organisations who prefer rigorous quality assurance of critical analysis work.

Key content:

The course uses examples extracted from real projects to illustrate core concepts, and includes the following:

- Common modelling assumptions - static linear; static non-linear; eigenvalue modes/buckling; harmonic; linear dynamic; non-linear transient; thermal steady-state/ transient (as relevant to attendee interests).
- Model/element common types/properties - their applications and limitations.
- Degrees of freedom, and translating FEA mathematics into plain language.
- CAD geometry vs FEA representation: solids, plates, beams, springs etc.
- Correct / consistent units.
- Model continuity and effective connections.
- Mesh refinement, convergence and assessment stresses (eg. for fatigue).
- Common loading types.
- Test models to confirm or understand principles.
- Balanced load models and inertia relief techniques.
- Symmetry and anti-symmetry - why and how.
- Pre-solve model verification (mass, CofG, mesh and joint connections, materials, properties, sum forces/moments, constraints).
- Constraints - getting them right and checking them properly.
- Analysis errors, causes and resolutions. Error diagnosis and avoiding "results fudges".
- Post-solve model confirmation.
- Results - Is the model what is expected?
- Results - Is the model "right"?
- Mesh refinement, accuracy and convergence (solver convergence, results convergence).
- Common FE tools / techniques (eg. rigid elements, sub-modelling, equivalent properties, results as loads, free-body results, constraint equations, mesh adaptivity, results algebra, enveloping, run-time efficiency).
- Common non-linearities and their practical effect on analysis.
- Assembly and Contact modelling.
- Making critical decisions with FEA results.
- Principles of dynamics: harmonic / transient / damping / shock / random.
- Principles of eigenvalue and non-linear buckling.
- Principles of steady state / transient heat transfer and thermal stress.
- Principles of optimisation.
- Attendee requests.



Every course benefits from a degree of tailoring based on the specific interests of attendees - it should thus be noted that the time allocated to the last six bullet points depends on attendee input and questions.

EnDuraSim also runs separate advanced training courses on specific analysis disciplines such as Non-Linear, Dynamics and Thermal Analysis.

About the course leader:

The course is conducted by Vernon McKenzie, who has 25 years industry experience in the application of FEA to real engineering problems.

Vernon has conducted dozens of specialist FEA courses over decades, to engineers in many of Australia's most significant engineering organisations. He draws on experience with numerous industrial FEA projects, often where the physics and/or model complexity is at the more challenging end of the mechanical/structural FEA spectrum.

Other course details:

The course is available in-house with tailoring to suit specific requirements, or as a public course with attendees joining from multiple organisations.

The course notes are (despite a Femap / Nastran flavour) also relevant to general purpose FEA packages, such as Abaqus, Marc, Ansys, Patran, NX Advanced Simulation, Strand7, Algor, Cosmos or Hyperworks.

The hands-on course components are centred around principles illustrated by test models, in-depth model checks, results comparison/verification and resolution of common FEA errors.

Contact:

Contact EnDuraSim anytime for further details including course dates, locations and cost, via email info@endurasim.com or phone 1800 367 332 in Australia, or +61 2 9484 7837.

Specific Femap with NX Nastran training, or on-the-project Analyst Mentoring is also available. EnDuraSim also provides FEA engineering project services.