NEi Software®

NEi Nastran Fatigue

Fatigue

Fatigue capability allows users to investigate the durability of a part under repeated loading. Understanding how a component behaves under repeated loading is important because parts often fail in service due to a cyclic load with a magnitude lower than their design load. NEi Nastran Fatigue features uniaxial and multiaxial fatigue models, allowing it to cope with stress histories coming from real world, complex, load inputs.

- Offshore structures
- Bolted joints
- Bridges
- Wind turbines
- Rotating machine components
- Aircraft structures
- Electronic assemblies

Fatigue Applications

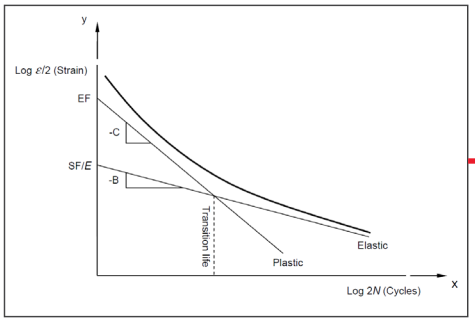
NEi Nastran's multiaxial fatigue is capable of calculating fatigue life based on stress-life (S-N) theory and strain-life (E-N) theory. Both the stress-life and strain-life methods allow users to input multiple time history loads (either from test data or design data) to a static analysis along with material stress vs. cycle or strain vs. cycle information to extract life expectancy and accumulated damage. These results can be viewed as a contour plot for easy visualization of critical areas with respect to fatigue, based on damage level or cycles / life to failure.

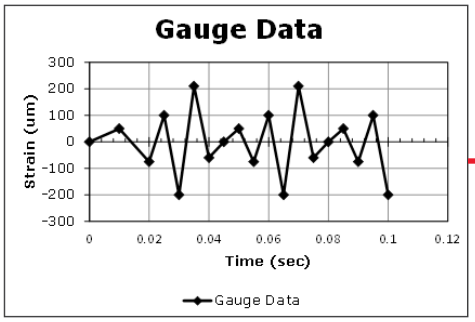
User Input

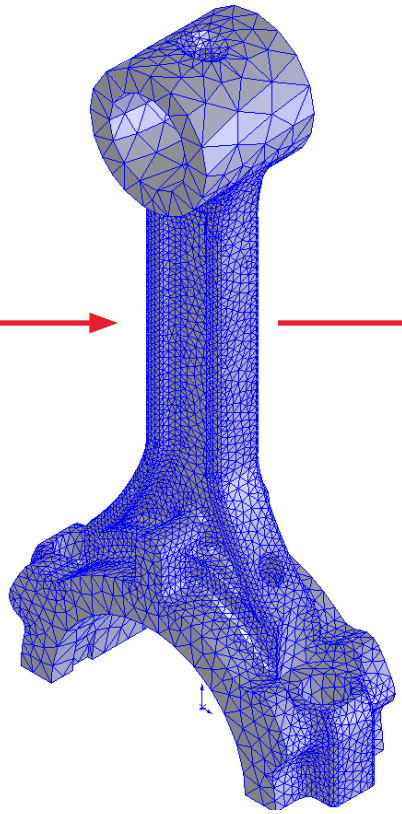
- Load-time history
- S-N (stress vs. number of cycles) or E-N (strain vs. number of cycles) material information

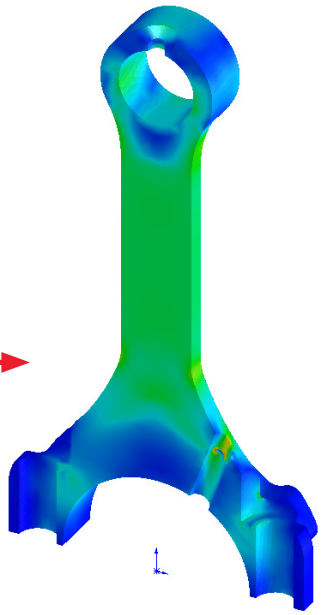
Output

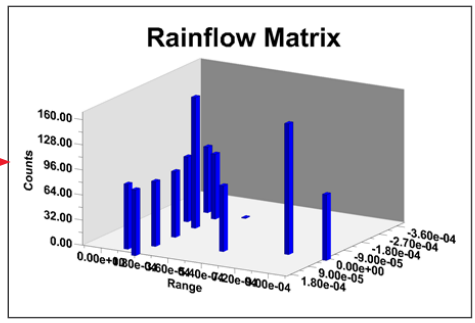
- Accumulated damage contour plots
- Life contour plots
- Rainflow matrix
- Damage matrix

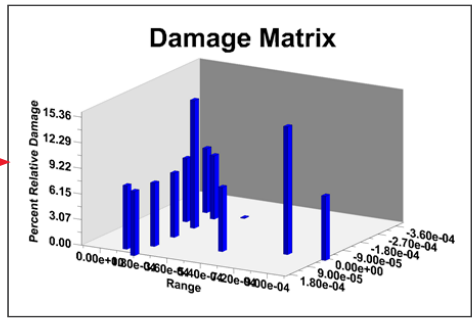


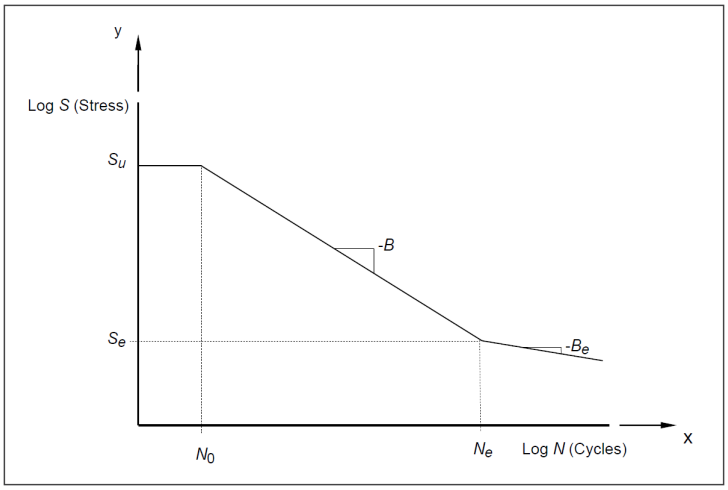




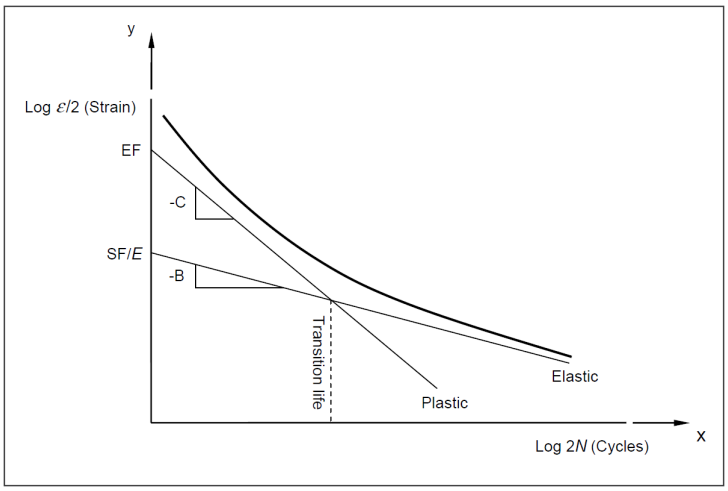








Stress-life material input

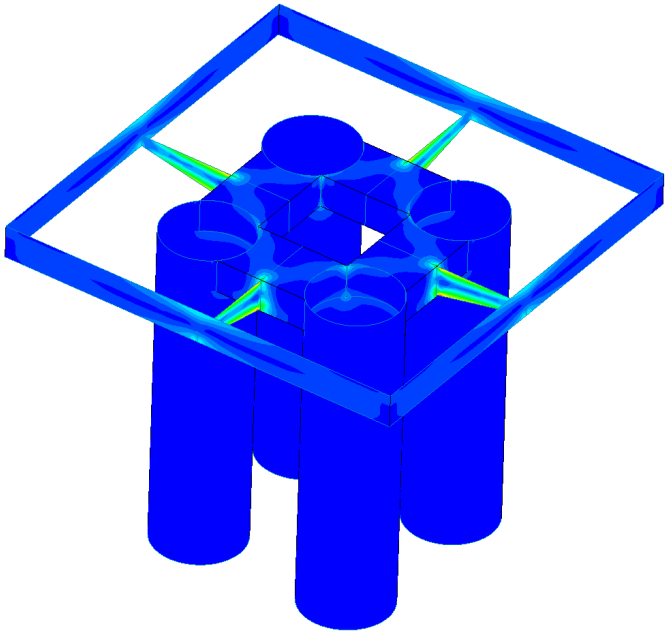


Strain-life material input

Random Vibration Fatigue

Random vibration fatigue (or spectral fatigue assessment) is an extension of NEi Nastran's random response solution. Vibration fatigue allows users to simulate vibration shake tests that would have an input PSD. This would be applicable to dynamic analyses that have random inputs such as road vibration, wave cycles, wind loads, or engine vibration.

Vibration fatigue within NEi Nastran is capable of stress-life and strain-life theory, along with Steinberg's three band method, and is used to calculate damage and life.



Damage accumulation plot from a 0.8g RMS for 84.7 minutes

About NEi Software

NEi Software is a world leader in CAE innovation supplying Nastran Finite Element Analysis (FEA), engineering simulation, and virtual testing software solutions. The core product NEi Nastran is a powerful, industry-proven FEA solver that thousands of companies routinely use to perform linear and nonlinear structural stress, dynamics, and heat transfer analysis. In addition, NEi Software's portfolio includes products for impact, kinematics, fatigue, acoustics, optimization, aeroelasticity, and Computational Fluid Dynamics (CFD) with support for a full range of materials from composites to hyperelastic rubber. NEi Software covers the different needs of each stage of the product development process, from designers looking for affordable, easy-to-use, CAD-based simulation for validation and trade-off studies to dedicated FE analysts looking for high accuracy, productivity, and real world fidelity. The website features case studies in aerospace, automotive, maritime, military, civil, petroleum, medical, and consumer products with videos, webinars, tutorials, and options for evaluation.

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