

NX I-deas Advanced Durability

Predicting product life and fatigue damage

fact sheet

Siemens PLM Software

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► Summary

NX® I-deas® Advanced Durability software is a sophisticated add-on module to the standard Durability software within NX I-deas. Augmenting the capabilities of Durability and NX MasterFEM, Advanced Durability helps predict product life and evaluate fatigue damage due to prescribed static or transient loading. In-depth fatigue analysis results and life calculations aid the user in determining product durability and evaluating issues of cyclic loading. Built-in data processing tools enable the user to easily import, export, manage and capitalize on the results of this advanced prediction package.

Benefits

Determine the life of product designs and analyze fatigue damage due to static or transient events

Calculate product life using either uni- or bi-axial loading of FE stress or strain results

Perform test/analysis correlations, prediction validity checks and fatigue histogram analysis

Features

Generate and manage loading histories from test measurements or FE software

Import stress results from NX Model Solution of NX Variational Analysis within NX I-deas or third-party software (e.g., NX Nastran, MSC.Nastran, Abaqus or Ansys)

Perform axial loading cycles via statistics, searching or critical plane

Use a wide range of fatigue algorithms for both uni-axial and bi-axial cycles

Import, manage and display fatigue properties and S-N curves

Display durability results for life and fatigue as contour or arrow plots

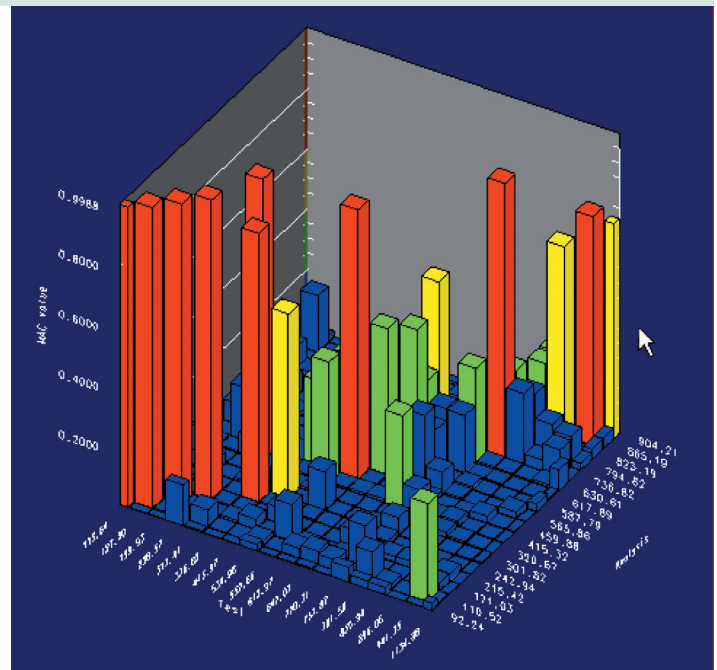
An advanced toolset for determining product life and fatigue damage

NX I-deas Advanced Durability provides a set of analytical tools to predict the life of products and evaluate their fatigue when subjected to prescribed loading histories and duty cycles. Loading histories may be generated from test measurements or analytical software.

Product life is calculated using stress or strain results from finite element analysis. Both uni-axial and bi-axial loading are considered for various life criteria.

Fatigue evaluation is used to estimate life and damage due to various loading events. Estimates can also be made for the total damage incurred during a duty cycle containing multiple events of multiple occurrences. The damage and life results are displayed as contour or arrow plots. You can select either FE stress or strain to perform fatigue evaluation. Advanced Durability can import, manage and display fatigue properties and S-N curves.

Stress and strain functions used for fatigue evaluation and cycle counting can also be generated and stored. You can use them to perform test/analysis correlation, or you can export them for external fatigue analysis.



System requirements

NX I-deas Advanced Durability shares NX I-deas system requirements.

Recommended system configuration

For information on particular operating systems or graphics cards, please visit http://support.ugs.com/online_library/certification/

Advanced Durability supports the following fatigue algorithms for both uni-axial and bi-axial cycles:

- stress life (Goodman, Gerber, Soderberg and Morrow)
- strain life (Morrow, Smith-Watson-Topper, Brown-Miller) ASME (Boiler and Pressure Vessel Code)
- welds (British Weld Institute Formulation)
- user-defined S-N curves (stress or strain)

Advanced Durability performs quality checks to test the validity of fatigue results. And fatigue histogram analysis can be applied on both FE stress or strain and imported strain or stress functions.

Advanced Durability also provides a range of data processing tools to import/export, edit and manage files.

Static and transient fatigue analysis

Advanced Durability offers in-depth static and transient fatigue analysis capabilities.

Static analysis to evaluate durability

Static fatigue analysis is used to evaluate the durability of a general FE model when a set of time-variant static loads is applied sequentially or simultaneously. You can use either linear or nonlinear FE results for static fatigue analysis.

FE static results can be combined linearly by static fatigue analysis to generate a stress (or strain) history for fatigue assessment. This analysis allows you to use geometry-based loads (e.g., pressure, edge or surface) or FE-based loads for linear superposition. It can also take a set of stress or strain results defined in their sequential order for fatigue calculations. This is particularly useful for fatigue analysis using nonlinear FE results. You can use NX Model Solution, NX Variational Analysis or external solvers (e.g., NX Nastran, MSC.Nastran, Abaqus or Ansys) to prepare linear or nonlinear stress/strain results for static fatigue analysis.

Transient analysis to calculate damage and life

Transient fatigue analysis is used to calculate dynamic stress and strain histories, and, thus, life and damage of a general FE model when a set of time-domain transient loads is applied. Transient fatigue analysis uses either the mode acceleration method or the mode display method to generate dynamic stresses/strains for fatigue analysis. You can use Model Solution or external solvers to generate modal models for transient fatigue analysis.

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