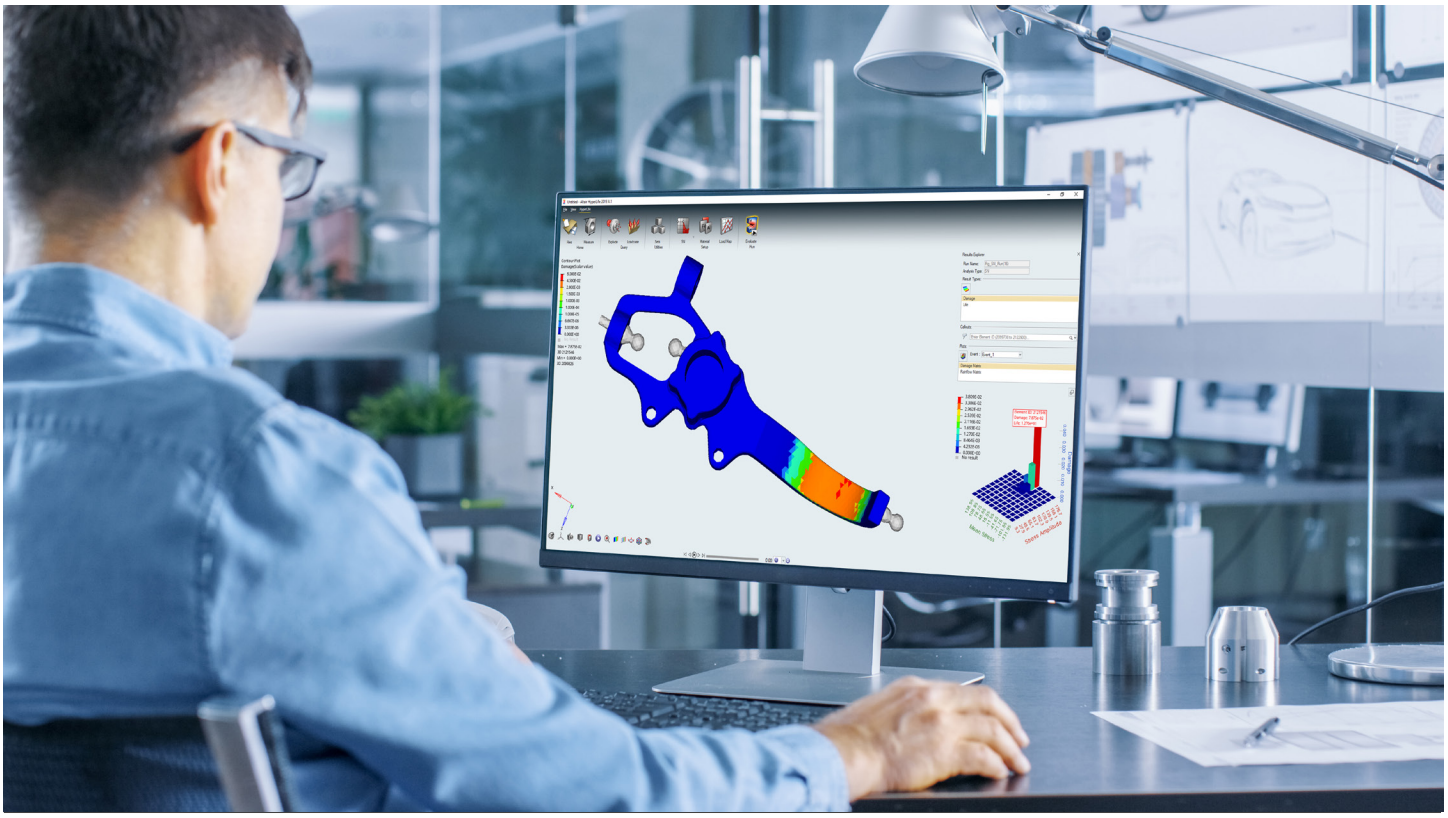
Altair HyperLife™

Fatigue Life and Durability Prediction Workflow

Altair | HyperWorks



Altair HyperLife is a comprehensive and easy to use durability analysis tool directly interfacing with major FEA result files. With an embedded material database, HyperLife offers solutions for fatigue life predictions under static and transient loading across a range of industrial applications.

Product Highlights

- Fast and reliable Fatigue software to calculate damage and Fatigue life
- Durability workflows embedded and integrated for CAE based Fatigue evaluation
- Standard Material Database with more than 500 sets and utilities to estimate and generate Material curves
- Specialty module for Fatigue strength assessments according to numerous design codes and guidelines for both welded and unwelded material. (Available on request for FKM, EC3 and DVS1612)

Learn more:
altair.com/hyperlife

Benefits

Easy to Learn
The easy to use and easy to learn GUI, will bring efficiency to simulation teams. The intuitive user experience enables novice to expert users to perform Fatigue life predictions at ease.

Solver Neutral
The most commonly used FEA result data from leading solvers can be interfaced as input file.

Accelerated Decision Making
Perform multiple variations of analysis settings without starting a new session there by accelerating decision making and saving cost.

Capabilities

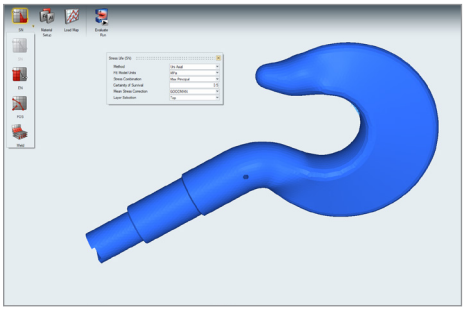
Fatigue Analysis Method

- **Stress Life (SN) and Strain Life (EN)**
  Uniaxial and Multiaxial assessment options with multiple Mean stress correction theories. Various stress combination methods are available for Uniaxial assessment. Critical plane implementation for Multiaxial assessment.

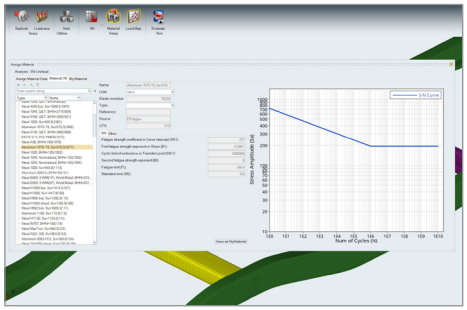
  For Stain-Life (EN) - Neuber plasticity option available for Uniaxial and Jiang-Sehitoglu plasticity model (default) for Multiaxial assessment.

- **Factor of Safety**
  Factor of Safety calculations based on Dang Van fatigue limit criterion which is used to predict if a component will fail in its entire load history.

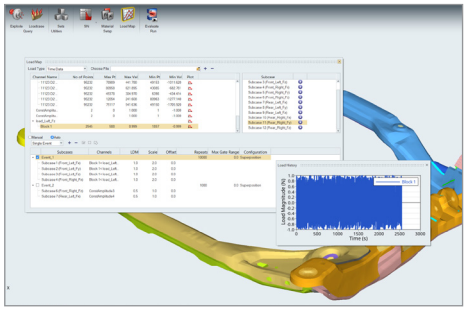
- **Weld Fatigue**
  Weld Fatigue assessment type is available for Spot Welds and Seam Welds.
  - Spot Weld
    Structural stress method implementation when spot weld nuggets are idealized with CHEXA, CWELD and CBAR/CBEAM element representation.



Methods



Materials



Loadmap

• Seam Weld
Structural stress method implementation for Seam welds idealized with plate or shell elements. The approach is based on VOLVO method. Supported weld type is FILLET weld and the weld lines (root and toe) are automatically identified seam weld fatigue analysis based on VOLVO method.

Material Database
Materials can be created and assigned to the parts. The application is preloaded with a library of Fatigue material properties, from which you can choose. The user can also load materials from their data database or create new materials in the session. Materials can be estimated based on UTS
and assigned to parts.

Signal Processing
A simple yet robust signal processing available with LoadMap utility. Durability events can be created automatically or manually for pairing FEA loadcases and fatigue loadhistory files. Commonly used Loadhistory file types: DAC, RPC and CSV file formats are supported. A simple sine curve or block loading sequence can be created on one click.

Analysis
The Fatigue analysis setting can be reviewed before submitting the run. Once the analysis is completed, the results can be subsequently loaded to visualize the Damage and Number of Cycles to Failure contour. A 3D histogram of Damage matrix and Rainflow matrix is available. The same geometry can be re-rerun after modifying any settings in the previous steps.

		Stress State	Mean Stress Correction	Plasticity
SN	Uniaxial	Abs Max Principal Max Principal VONMISES Signed von Mises TRESCA Signed TRESCA Signed Max Shear X Normal Y Normal Z Normal X-Y Shear Y-Z Shear Z-X Shear	Goodman (Default) Gerber Gerber2 Soderberg FKM	NA
	Multiaxial	NA (Stress tensors are directly used)	Goodman - Tension damage model FKM - Tension damage model Findley - Shear damage model	NA
EN	Uniaxial	Abs Max Principal Max Principal Min Principal VONMISES Signed von Mises TRESCA SGTRESCA Signed Max Shear X Normal Y Normal Z Normal X-Y Shear Y-Z Shear Z-X Shear	Smith-Watson-Topper (SWT) Morrow Morrow2	Neuber
	Multiaxial	NA (Stress tensors are directly used)	Smith-Watson-Topper (SWT) - Tension damage model Fatemi-Socie Model (FS) - Shear damage model Brown-Miller Model (BM) - Shear damage model	Jiang-Sehitoglu plasticity model - Non-proportional loading (Default, not exposed.)

Welds	Method	Mean Stress Correction	Weld Elements	Plasticity
Seam	VOLVO	FKM	Shell elements	NA
Spot	RUPP	FKM	CBAR CBEAM CWELD CHEXA	NA

Supported file formats for Welds are H3D and OP2.