Your Benefits

- Very fast and reliable fatigue analysis for stochastically loaded systems (electronic boxes, add-on parts, car bodies, …)
- FE analysis in frequency domain (modal frequency response analysis for unit load cases)
- Load spectra definition in FEMFAT - simple and flexible consideration of different load situations by change of load PSDs within FEMFAT
- Different probability models (Rayleigh, Dirlik, ...)
- Influence factors, e.g. stress gradient, mean stress, PLAST ...
- Compatible with FEMFAT weld and FEMFAT spot

Interfaces

- ABAQUS
- ANSYS
- NASTRAN
- PERMAS

FEMFAT spectral

FINITE ELEMENT METHOD FATIGUE

Head Office:

Austria
Magna Powertrain
Engineering Center Steyr GmbH & Co KG
Steyrer Strasse 32, 4300 St.Valentin
Helmut Dannbauer
Senior Manager Simulation / Testing

FEMFAT Support and Sales
Phone: +43 7435 501 5300
femfat.support.mpt@magna.com

Sales Offices:

Japan
Magna International, Tokyo
Noriyuki Muramatsu
Phone: +81 3 3548 0310
noriyuki.muramatsu@magna.com

China
Magna Powertrain, Shanghai
Aisheng Tang
Phone: +86 21 6165 1662
aisheng.tang@magna.com

Sales Partners:

Brazil
Virtual CAE
Sao Caetano
Phone: +55 1142 2913 49
femfat.support.brazil@virtualcae.com.br

India
Finite to Infinite
Pune
Phone: +91 86 6846 0087
femfat.support.india@finitetoinfinite.com

Rep. of Korea
CAE-Cube
Anyang
Phone: +82 3134 43061 2
tjkim@cae-cube.co.kr

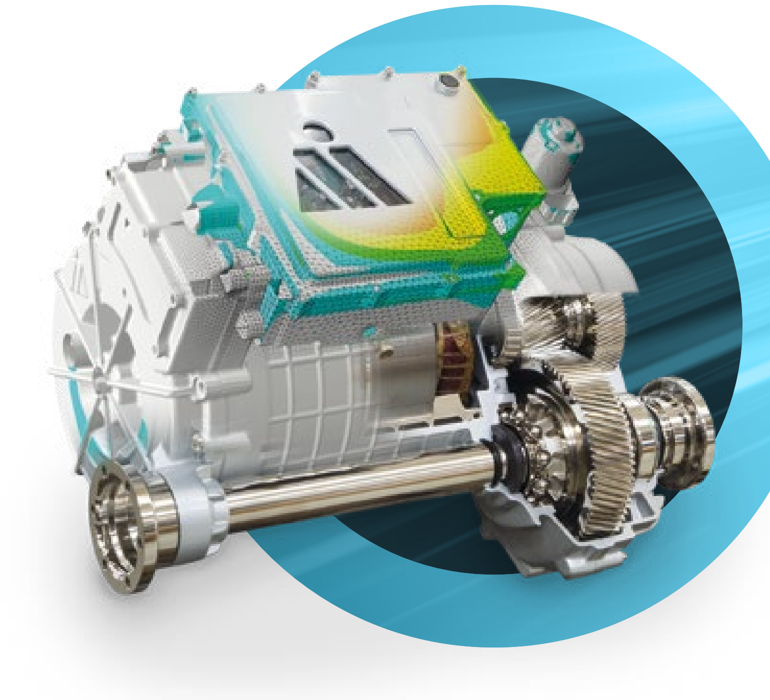
France, Belgium & Luxemburg
CIMES France
Valenciennes
Phone: +33 3274 1737 4
support@cimesfrance.com

Italy
EnginSoft
Padova
Phone: +39 4977 0531 1
femfat.support.italy@enginsoft.it

USA
Computer Aided Technology (CATI)
Ann Arbor, MI
Phone: +1 734 7863 721 101
rober.baack@cati.com

FEMFAT spectral

BY MAGNA POWERTRAIN



Random Response Fatigue

- Assessment of stochastic loads
- Accurate and efficient FEMFAT module
- Compatible concepts to BASIC and MAX

femfat.magna.com

Random Response Fatigue

FEMFAT spectral module is designed for fatigue analysis (damage, life) of multiaxially, stochastically loaded systems. Loading is defined by power spectral density functions (PSDs) for correlated and uncorrelated loading behavior. SPECTRAL operates completely in frequency domain.

The consideration of time signals with a strong random character leads to high computational effort. If the time signal is stochastic and the mechanical system linear the fatigue analysis can be directly done in frequency domain. The calculation with FEMFAT spectral is very effective with a speed-up factor of up to 100 compared to time signals.

Method

FEMFAT spectral uses a unit-load based approach which is comparable to a ChannelMAX simulation. Modal stresses from the Eigenfrequency Analysis and Modal Transfer Functions represent the unit load cases.

The loading of the structure is described by power spectral densities (PSDs). PSDs are derived from the time signal, using e.g. FEMFAT LAB or from testing standards. Auto- and cross PSDs can be defined for the stochastic loading, additionally a constant stress can be superimposed. For the subsequent damage analysis stresses from unit load-cases are multiplied by PSDs. Reliable cutting plane methods and equivalent stresses are used together with probability models like Rayleigh or Dirlik.

This forms the basis for accurate damage analysis. Additionally several influence factors can be considered for fatigue analysis, including mean stress, WELD and SPOT.

Eigenfrequency Analysis

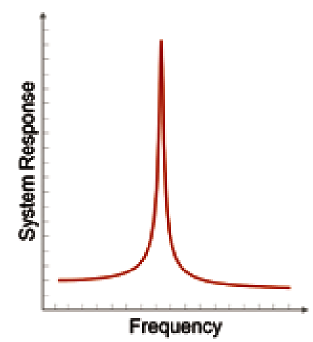
INPUT
- FEA model
- Material Properties

OUTPUT
- Modal Stresses

Frequency Response Analysis

INPUT
- Eigen Modes
- Material Properties
- Sampling Resolution

OUTPUT
- Modal Transfer Function



FEMFAT spectral Analysis

INPUT
- Modal Stresses
- Modal Transfer Function
- PSD

OUTPUT
- Damage
- Multiaxiality Degree