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fe-safe 2024
WHAT'S NEW?

DASSAULT SYSTEMES

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fe-safe 2024 GA

GA.1 Support for 2024 Abaqus ODB files

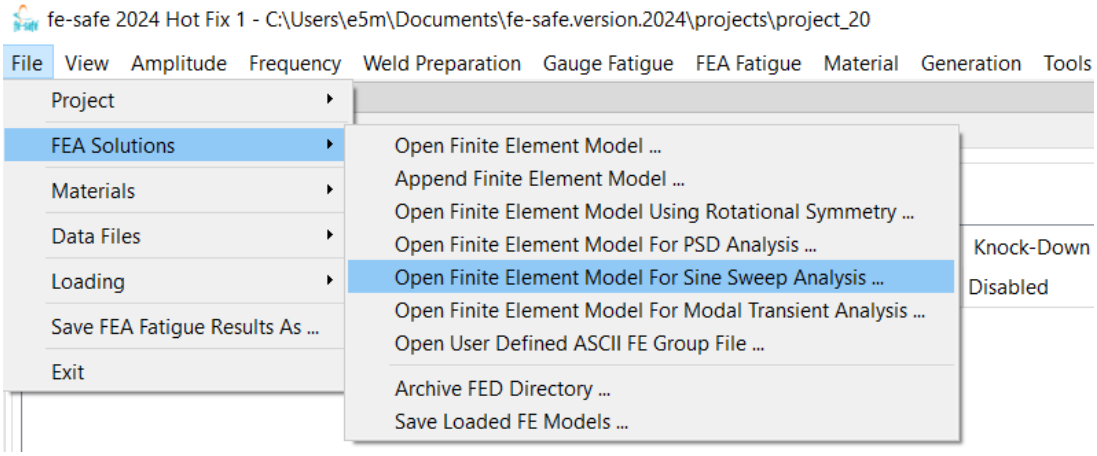
fe-safe 2024 FD01 (FP.2405)

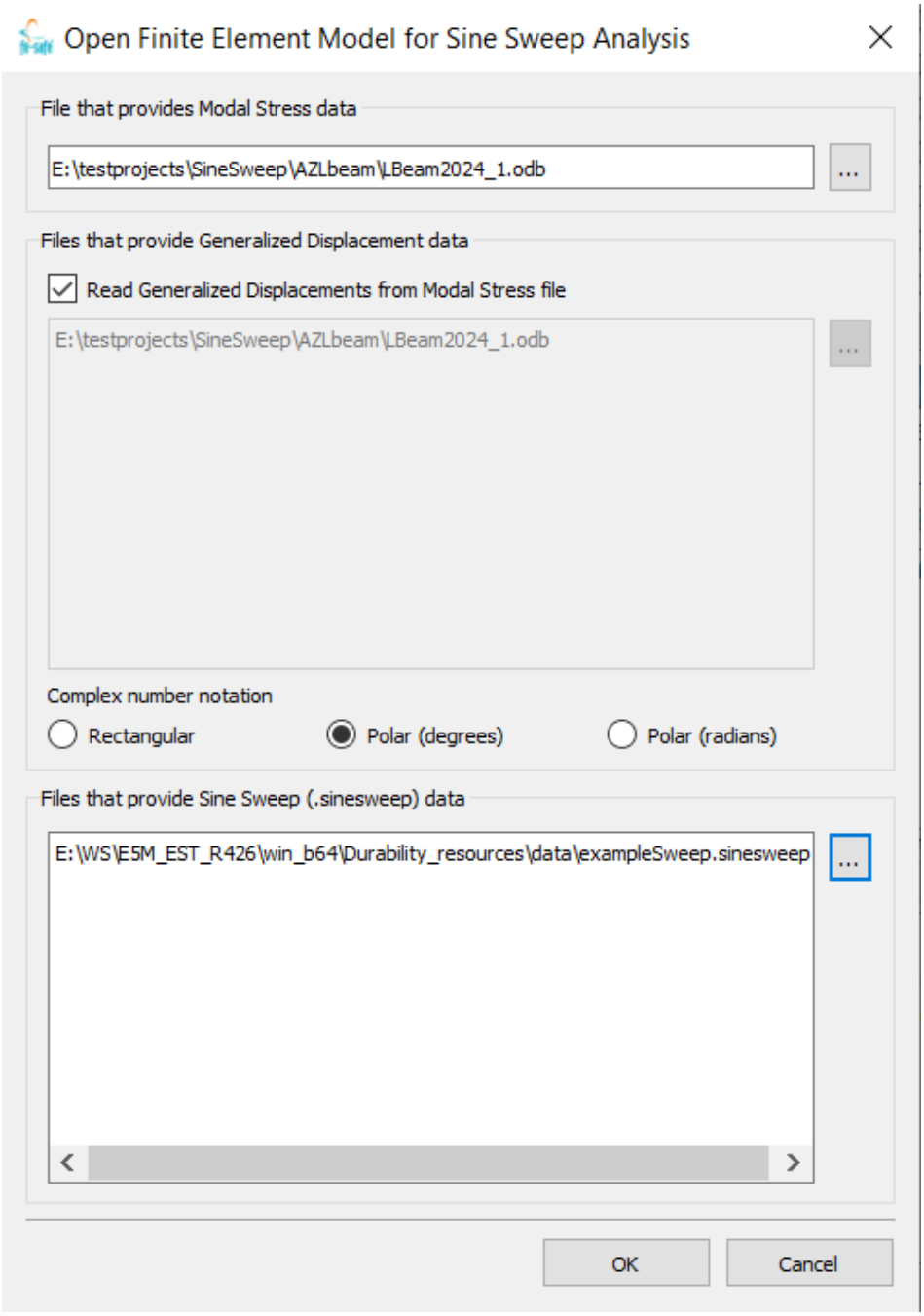
FD01.1 Sine Sweep

Many automotive manufacturers do not have accurate fatigue loading data for the mechanical components they build. In such cases the solution is to design in compliance with particular guidelines or rely on simplified tests that are able to cover the worst case scenarios. The Sine Sweep Vibration Test is one of those simplified tests that can be used to assess the component's durability, particularly with respect to the eigenfrequencies of the structure. In a sine sweep test the base excitation input consists of a single frequency at any given time, but the frequency itself varies with time. It may begin at a low frequency and then sweep up to a high frequency, be maintained for a while, then be reduced again. The new Sine Sweep fatigue analysis is in the frequency domain, like the random vibration (PSD) capability. The generalized displacements (aka modal coordinates) and modal stresses obtained from a harmonic analysis are combined with the definition of the base excitation sweep amplitudes to obtain a frequency amplitude response function, which is then integrated over to obtain the total damage.

Creating a sine sweep job

A Sine Sweep analysis is defined in a similar way to a random vibration analysis, using a specialized FEA Solution Open option as indicated below. This leads to a similar dialog to the random vibration analysis, but a .sineweep text file is supplied instead of the PSD file. This consists of a header defining total sweep time, rate type (linear or log), and optional units; followed by a table of frequency-amplitude pairs defining the sweep and the input acceleration amplitudes. An example is given below, with specification details in the User Guide.





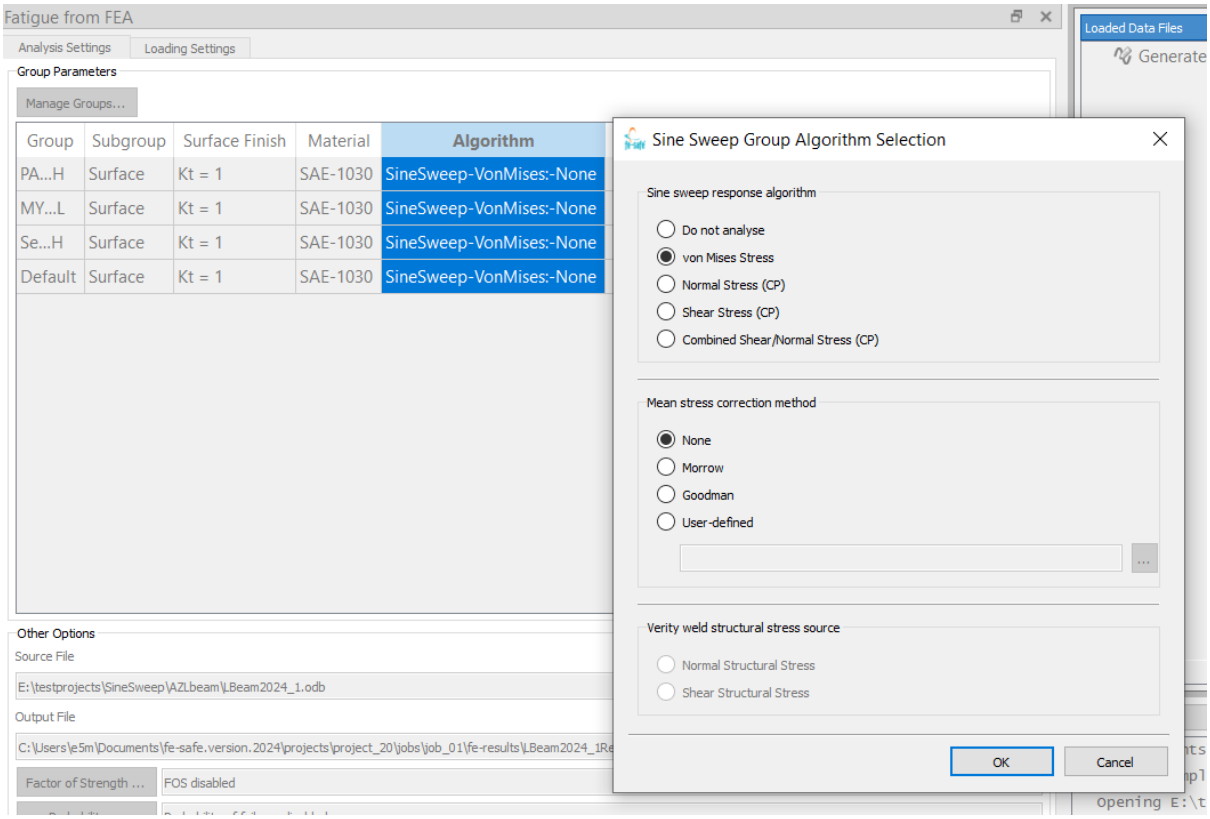
Sine Sweep response algorithm selection

The response function analysis options are similar to the random vibration, and are selected through a specialization of the group algorithm menu:

- Von Mises
- Normal Critical Plane
- Shear Critical Plane
- Combined Shear and Normal Critical Plane

A residual stress can also be defined, and a mean stress correction selected for it.

If a weld group is analysed, then a special response function based on the structural stress is used (similar to with random vibration), using either the normal or shear structural stress as selected.



Sweep Definition Example

An example of the .sinesweep definition file is shown below, giving header information followed by frequency/acceleration inputs from 0.5 to 200Hz. See User Guide for further details on header options.

```
Exposure time: 1200s
LogSweep
Frequency units: Hz
Acceleration units: m_s2
0.5 0.01
1    0.25
5    0.5
10   1.0
50   1.0
100   1.0
150     0.5
175 0.1
200 0.0
```

FD01.2 DTMF with TCD

The DTMF algorithm and plug-in algorithms can now be used with Critical Distance (TCD) calculations.

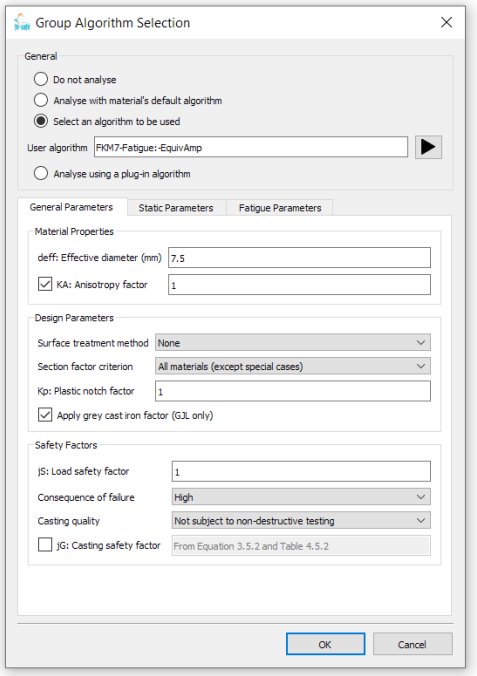
FD01.3 FKM7

The FKM fatigue assessment algorithm has been updated to comply with the latest 7th Edition of FKM Guideline, 'Analytical Strength Assessment of Components Made of Steel, Cast Iron and Aluminum Materials'.

In addition to fatigue assessment of non-welded components, you can now carry out the static assessment of non-welded components, where a static assessment is performed at each turning point of the fatigue loading.

The material databases distributed with fe-safe have been updated according to the 7th Edition. Materials can be selected from either the 'FKM_Fe.dbase' (for steel/iron) or 'FKM_Al.dbase' (for aluminium) material databases.

Many of the parameters used in static and fatigue assessments can be set through the Group Algorithm Selection dialog.



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