DASSAULT SYSTEMES

SIMULIA

3DEXPERIENCE

fe-safe® INDUSTRY SECTOR APPLICATIONS

DURABILITY ANALYSIS SOFTWARE FOR FINITE ELEMENT MODELS

AUTOMOTIVE, GROUND VEHICLE & OFF HIGHWAY

Powertrain & Engines

fe-safe is used widely for powertrain applications. It can use FE models of the rotation of crankshafts and the movement of pistons and con-rods. It can account for rapid temperature variations, can map the material property changes through the engine cycle and can handle complex loading conditions, intermittent contact and complex duty cycles. High frequency mechanical cycles can be superimposed on low frequency thermal cycles. Specific algorithms for cast metals are provided.

fe-safe includes high-temperature fatigue as standard. For higher temperatures, the thermo-mechanical module fe-safe/TMF also allows for the effects of strain-rate dependency, oxidation, bulk stress relaxation and strain ageing.

Suspension, Chassis & Cab

fe-safe can handle complex multiaxial road load data. The damage contribution from each road surface can be calculated and displayed in a single run. This means that fatigue tests can be shortened by only including the damaging parts of the duty cycle.

fe-safe uses PSDs, steady state modal and random transient dynamic analyses to calculate the effects of complex vibration fatigue. FE models of large flexible components and structures are analyzed efficiently.

Verity in fe-safe allows analysis of seam welds, structural welds and spot welds.

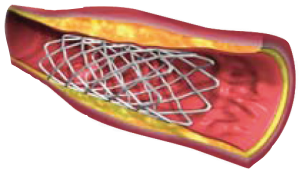
Exhausts

fe-safe/TURBOlife is used to predict the fatigue life of exhaust components. fe-safe/TURBOlife enables structural and thermal loading variations and creep and creep-fatigue interaction effects to be accounted for.

MARINE

fe-safe is being used by several companies for marine engine and power plant design. It can map the material property changes through the engine cycle and can analyze complex loading conditions and duty cycles. For ship hulls and structures, Verity in fe-safe provides fatigue analysis of welded joints using FE models with coarse meshes.

LIFE SCIENCES



fe-safe has been used within the medical industry for many years. The fatigue behavior of vehicle-mounted medical equipment as it interacts with the suspension dynamics of the vehicle and the road load input has been investigated using fe-safe. The fatigue properties of medical implants have also been assessed using fe-safe.

WIND ENERGY

fe-safe can analyze the effects of many of the complex conditions seen in wind turbines such as vibration, the effects of rotating components, complex loading conditions, and duty cycles consisting of different wind states. Weld fatigue and the effect of high temperatures can be included in the analysis.

For the fatigue analysis of composite turbine blades, fe-safe/Composites offers an unparalleled technical solution.

OIL & GAS PRESSURE VESSELS

Verity in fe-safe is the original, patented Structural Stress Method for the fatigue analysis of welded joints, offering a mesh insensitive approach that removes the subjectivity from welded joint fatigue analysis and provides new levels of accuracy. The Verity method is an approved method of analysis in the ASME Section VIII Div 2 design code.

RAIL

Axles, bogies, wheels, rail track, and welded steel and aluminum structures have all been analyzed successfully by fe-safe customers. Vehicle dynamics, rolling contact, residual stresses and the effects of manufacturing processes can all be included.

AEROSPACE

Loading spectra can be specified and the damage contribution from each block can be separately identified. The interaction between loading blocks and sequence effects are included. fe-safe allows higher frequency loads to be superimposed over a ground-air-ground cycle very efficiently with the minimum of FE solutions. fe-safe has been used for the analysis of aircraft engine components and can include thermo-mechanical and creep-fatigue interactions.

fe-safe/Composites is ideal for the analysis of helicopter rotor blades. Steel rotor hubs and composite blades can be analyzed in a single operation.

FOR MORE INFORMATION VISIT

www.3ds.com/fe-safe

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