MSC Nastran™ Embedded Vibration Fatigue

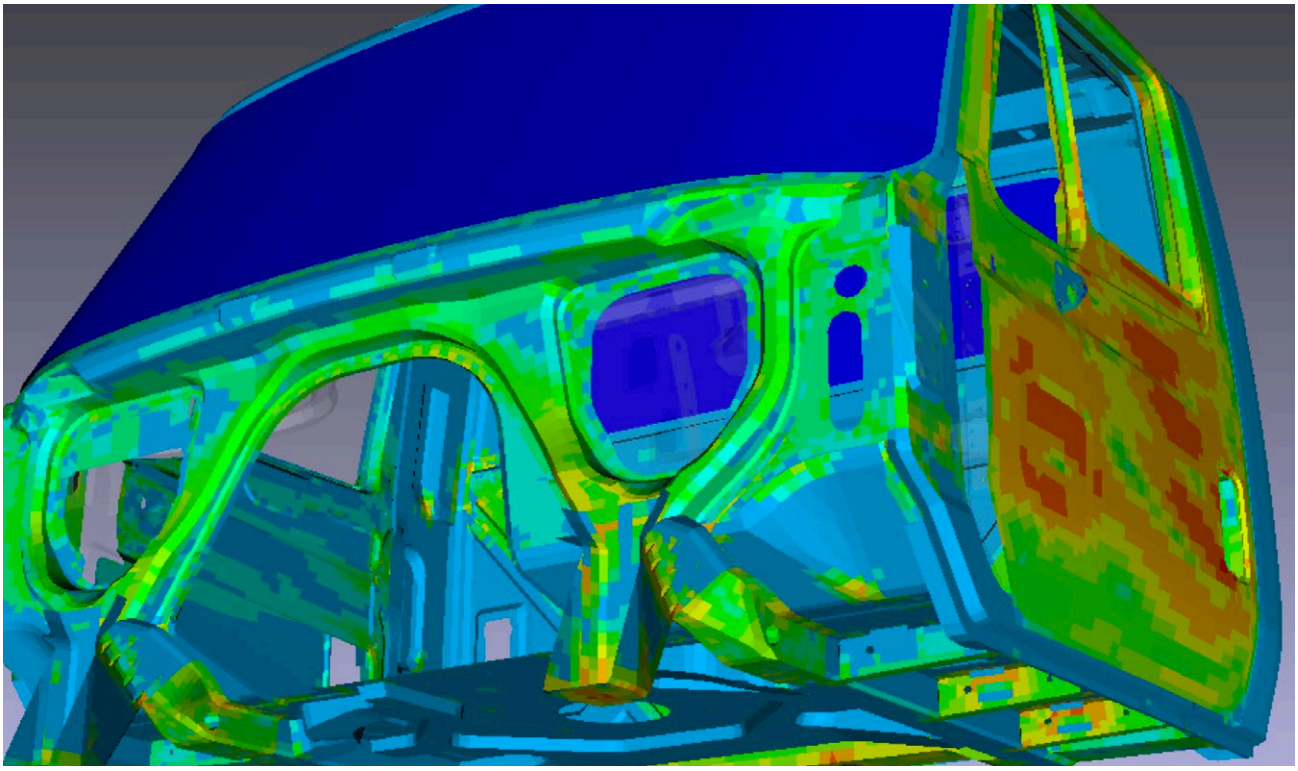
Integrated fatigue life studies for dynamic loads

Fatigue life estimates are generally obtained with simulations conducted in time domain. This approach may not apply to many real-world applications, especially when the parts being analyzed undergo complex, often random loading sequences. Dynamic nature of the loads also makes the use of time-domain analysis cumbersome, requiring excessive analysis time and large amounts of storage space.

MSC Nastran Embedded Vibration Fatigue overcomes this problem by using the frequency domain techniques that are often used for dynamic structural analyses. This computationally efficient procedure provides life estimates orders of magnitude faster, with only a small fraction of system resources compared to traditional methods and with minimal loss in accuracy. Frequency domain methods for structural analysis also offer superior qualitative information about structural response.

Benefits of using MSC Nastran Embedded Vibration Fatigue solution:

- Faster solution with dynamic loads (deterministic and random vibration)
- Significantly lower system resources compared to time-domain based solution
- Dramatically small disk usage, allowing you to solve large problems
- Higher productivity with simpler process that avoids the need for two separate processes for stress and fatigue analysis
- Better designs by coupling fatigue analysis with MSC Nastran's optimization solver

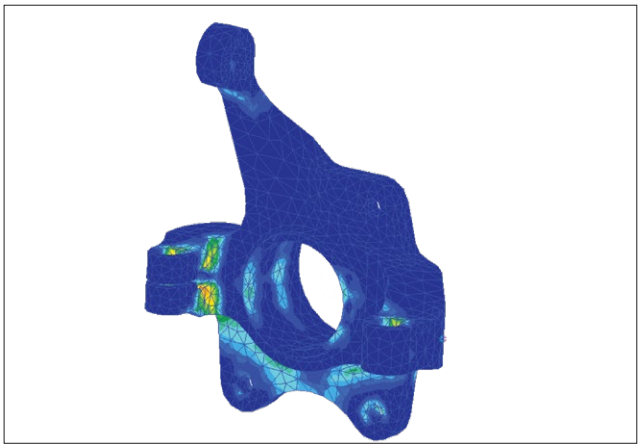


Supported loadings:

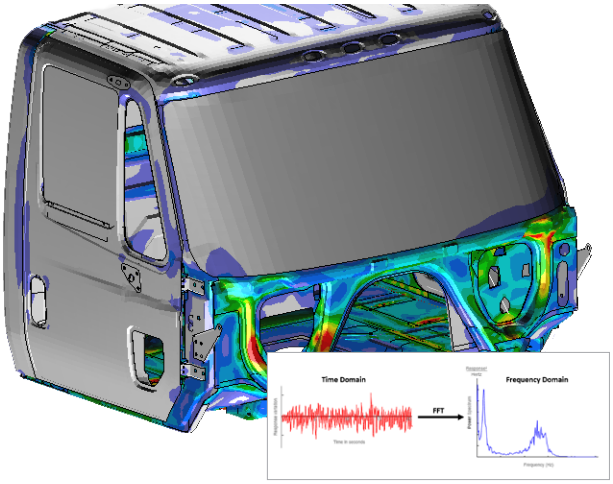
- Single-input random load with or without static stress offset
- Multi-load random input including cross-correlation with or without static stress offset
- Deterministic loading (single sine waves and narrow bands)
- Harmonic loading (multiple simultaneously applied sine waves)
- Sine and narrow band sweeps
- All of the above loading types can be assembled in to load events and sequences to make up realistic duty cycles

Vibration fatigue capabilities:

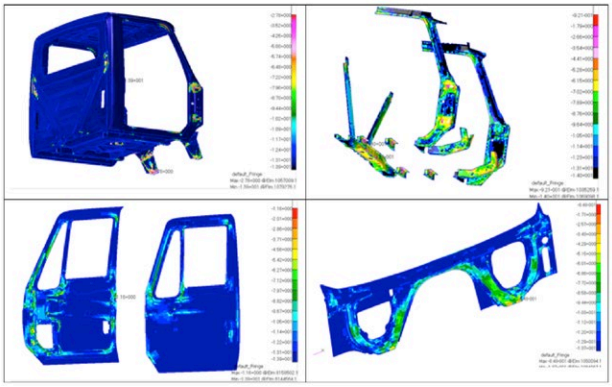
- Automatic conversion of time domain loading into equivalent power spectral density loads
- Stress life (S-N) solver
- Strain life (E-N) studies
- Factor of Safety (FOS) analysis
- Parallel processing multiple threads
- Multiple fatigue analysis in a single job submission
- Optimization for fatigue life with the use of MSC Nastran Design Optimization solution



Fatigue analysis of a steering knuckle



Truck cab model & applied load inputs - conversion to PSDs



Log of damage plots of the various component of the truck Lcab

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Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter. For more information, visit hexagonmi.com.

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