

Cut-Off Procedure for High Frequent Excitation

Reduction of high frequently vibrations due to seismic excitation and airplane crash (APC)

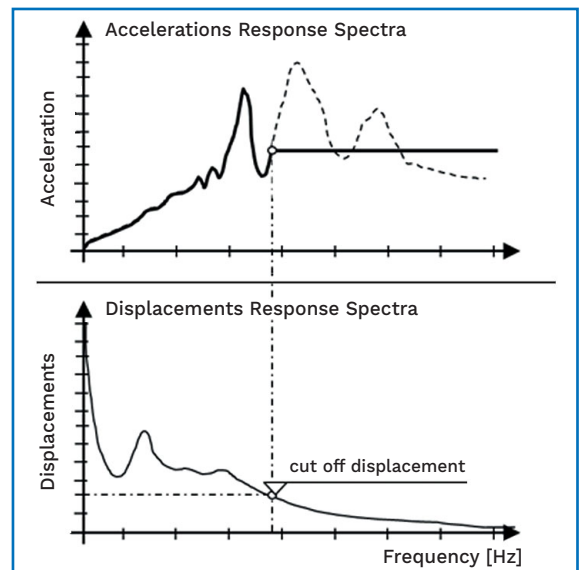
Framatome has technical solution for reduction of high frequently vibrations level due to seismic excitation and airplane crash

Challenge

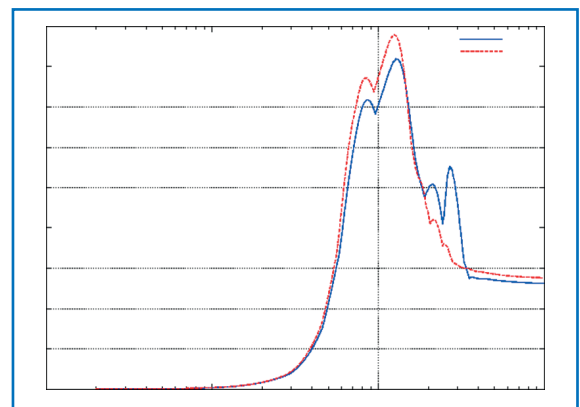
- High frequently vibrations due to seismic and airplane crash impact endangering the functionality of sensitive safety relevant equipment and components in nuclear power plant

Technical information

- Dynamic structural analysis for APC impact and seismic excitation is performed using discrete Fourier transformation to filter out the high frequency content of accelerations
- The number of coefficients used to describe the functions is determined based on a defined spectral displacement of 1 mm or a cumulative power value of 90%.
- The cut-off methodology is verified and confirmed by experiments where unfiltered and filtered acceleration time histories were applied to measure the dynamic response
- Operational vibration test data support the lack of high frequency effects
- The procedure confirm significant reduction of vibration level in high frequency range $f > 30$ Hz for corresponding low deformations $< 1,0$ mm



Cut-off procedure for high frequency range



Comparison of unfiltered and filtered response spectra

Customer benefits

- Analytical and empirical evidence confirm that short duration, high frequency excitations are not damaging power plant equipment
- Less conservative design of equipment and components neglecting vibrations level for high frequency range for $f > 30$ Hz
- Cut-off procedure – cost savings at components manufacturing based on less conservative component design

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