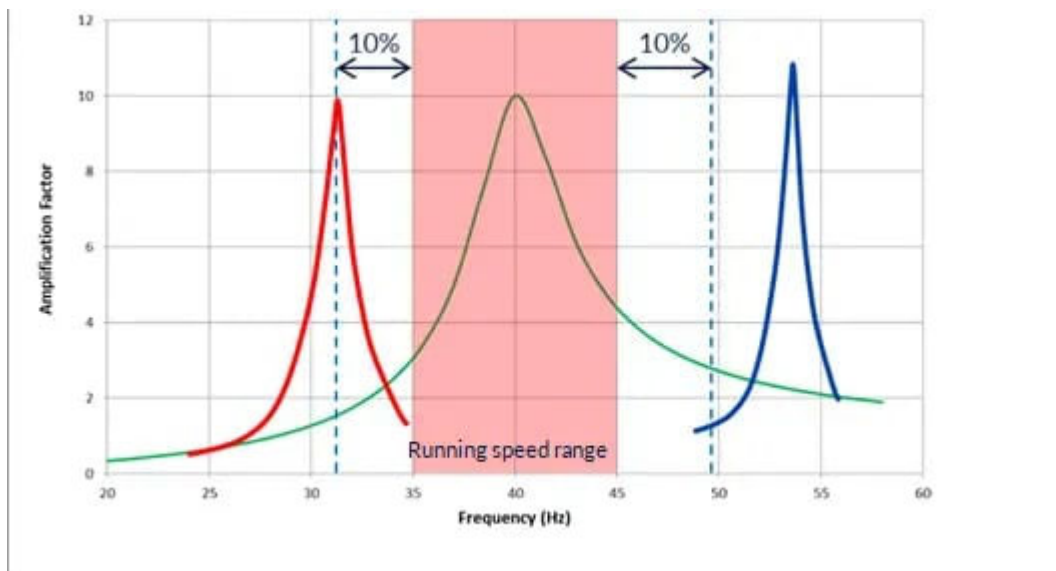


Resonance and Separation Margin in Mechanical Systems

1. Excitation of a Natural Frequency (Nf)
2. Insufficient damping and separation margin can lead to high or amplified vibrations
3. Damping: The dissipation of energy, typically through frictional or viscous forces
4. Separation Margin: The percentage difference in frequency between an excitation source (e.g., running speed) and the Nf.
5. Natural frequencies (Nfs) may vary over time due to aging or wear in mechanical plants

Typically, it is recommended that the separation margin be at least:

- 10% between **field-measured** Natural Frequencies (Nfs) and potential sources of excitation (e.g., 1x rpm or VPF).
- 15% or more if Nfs are accurately estimated using **Finite Element Analysis (FEA)**
- 25% if Nfs are estimated through **manual calculations**



Amplification factor versus frequency showing an example of 10% Separation Margin for variable speed machinery. The green Nf mode is unacceptable as it is within the running speed range. The modes indicated by blue and red meet or exceed a 10% separation margin criteria.