

TURBOMACHINERY RULES OF THUMB

By Neal Wikert

Vibration - Common Causes

Resonance – Each part of a machine has a resonant frequency that may be excited by a shock, small vibration or shock impulses.

Unbalance – Most common cause of vibration. Frequency is 1 per running speed. Amplitude of vibration is steady and proportional to unbalance.

Bent Shaft – Predominantly 1 per running speed, sometimes 2 times. It is accompanied by a high axial vibration component.

Bearings, Sleeve – Excessive clearance will result in vibration with a frequency of 1 time running speed.

Misalignment – Will result in a vibration with a frequency that can be 1, 2, or 3 times running speed. It is accompanied by a high axial vibration and may be as high as 1.5 times the vertical or horizontal readings.

Oil Whip – May occur in lightly loaded sleeve bearings. The frequency of vibration is sub synchronous (below running speed). Amplitude of vibration is radial and unsteady.

Looseness – Mechanical looseness will result in a vibration with a frequency of 2 times the running speed. Amplitude is proportional to looseness.

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