부록 (APPENDIX)

$$T = T_s \times N = \frac{N}{F_S} = \frac{N}{2.56 \times F_{max}} = \frac{lines}{F_{max}}$$

T = Time required to collect the waveform (시간파형을 수집하는데 요구되는 시간)

Ts = Time between each sample (각각의 샘플 사이 시간)

Fs = Sampling rate = Samples per second (샘플링 주파수, 초당 샘플 수)

N = Number of samples (1024, 2048, 4096, etc.) (샘플 수(개수))

$$Resolution = \frac{F_{max}}{lines}$$

$$Bandwidth = Resoution \times Window\ factor$$

Resolution (분해능), Bandwidth (대역폭), Fmax (최대 주파수), lines (라인수)

Window factor (창 인자)= 1 (no window/uniform/rectangular) 또는 1.5 (Hanning window)

Separating Frequency (분리 가능한 주파수) ≥ 2 x Bandwidth (대역폭) ≥ 2 x Resolution (분해능) * Window Factor (창 인자)

요구되는 스펙트럼 라인 ≥ 2 x Window factor x Fmax / Separating Frequency

Accuracy of Frequency (at peak) (피크에서 주파수의 확실성) = ± ½ x Resolution

Prime numbers (소수): 1, 3, 5, 7, 11, 13, 17, 19…

1 inch = 25.4 mm
1mm = 0.039 inches

Trial weight calculation (시험 추 계산):

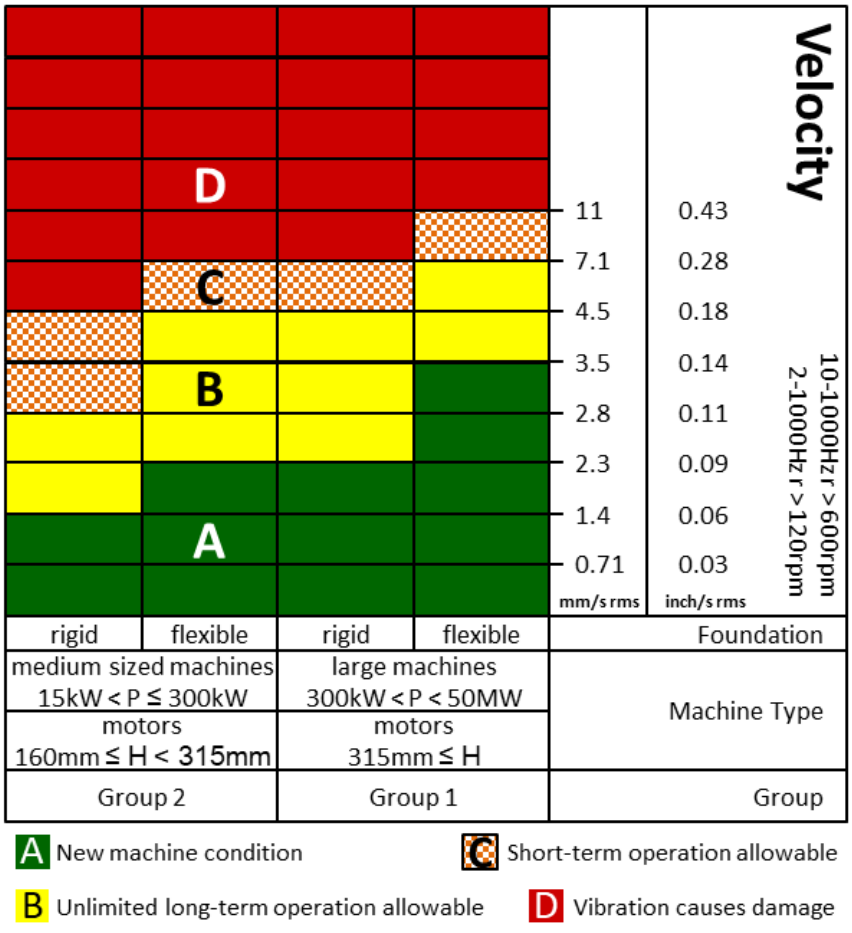
$$W = \frac{F}{K \times R \times N^2}$$

F = 10% of rotor mass divided by the number of bearings (회전자 질량의 10%를 베어링 숫자로 나눔) in kg (단위: kg)
K = 0.011
N = RPM/1000
R = Radius (반경) in cm (단위: cm)

Unit Conversions (단위 변환)

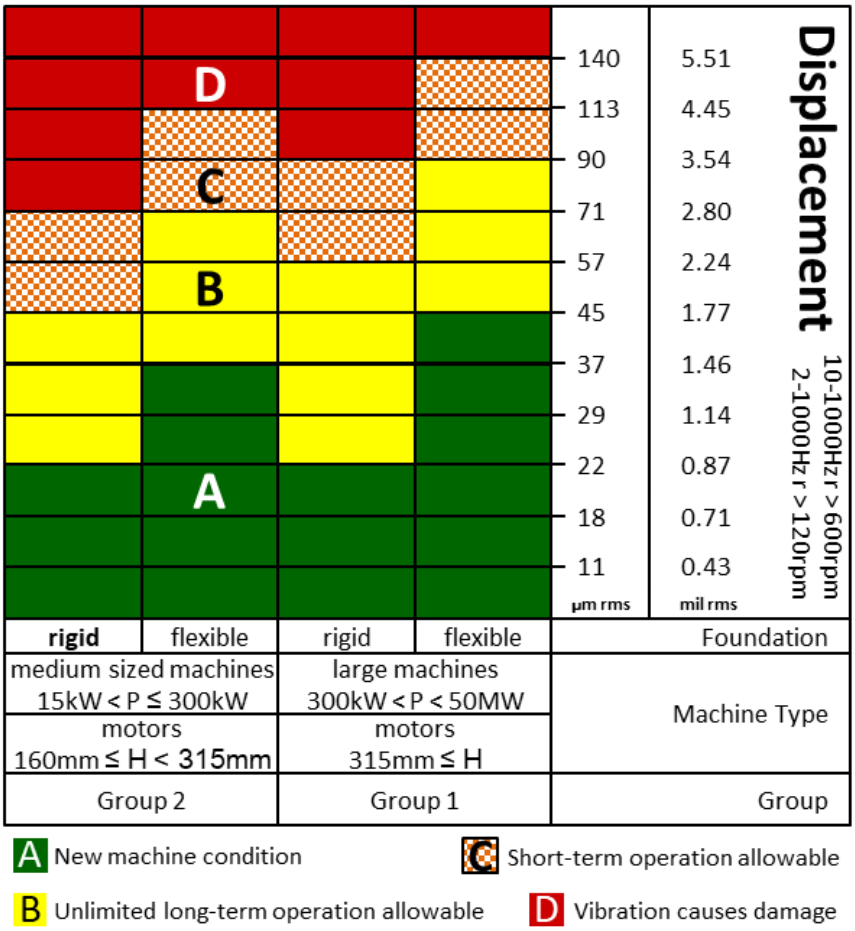
$D_{pk-pk} = \frac{19098\,V_{pk}}{f_{cpm}}$ $V_{pk} = \frac{5217\,A_{rms}}{f_{cpm}}$	$D_{pk-pk} = \frac{27009\,V_{rms}}{f_{cpm}}$ $V_{rms} = \frac{93712\,A_{rms}}{f_{cpm}}$
$D_{pk-pk} = \frac{9.958x10^7 A_{rms}}{f_{cpm}^2}$ $A_{rms} = \frac{f_{cpm}V_{pk}}{5217}$	$D_{pk-pk} = \frac{2.53x10^9 A_{rms}}{f_{cpm}^2}$ $A_{rms} = \frac{f_{cpm}V_{rms}}{93712}$
$V_{pk} = \frac{f_{cpm}D_{pk-pk}}{19098}$ $A_{rms} = \frac{f_{cpm}^2 D_{pk}}{9.958x10^7}$	$V_{rms} = \frac{f_{cpm}D_{pk-pk}}{27009}$ $A_{rms} = \frac{f_{cpm}^2 D_{pk-pk}}{2.53x10^9}$
D = Displacement: mils pk-pk V = Velocity: in/sec pk A = Acceleration: g rms F = 주파수: CPM	D = Displacement: micron pk-pk V = Velocity: mm/sec rms A = Acceleration: g rms F = 주파수: CPM 1 g rms = 9.8m/sec^2

ISO 10816-3 Vibration Severity Chart

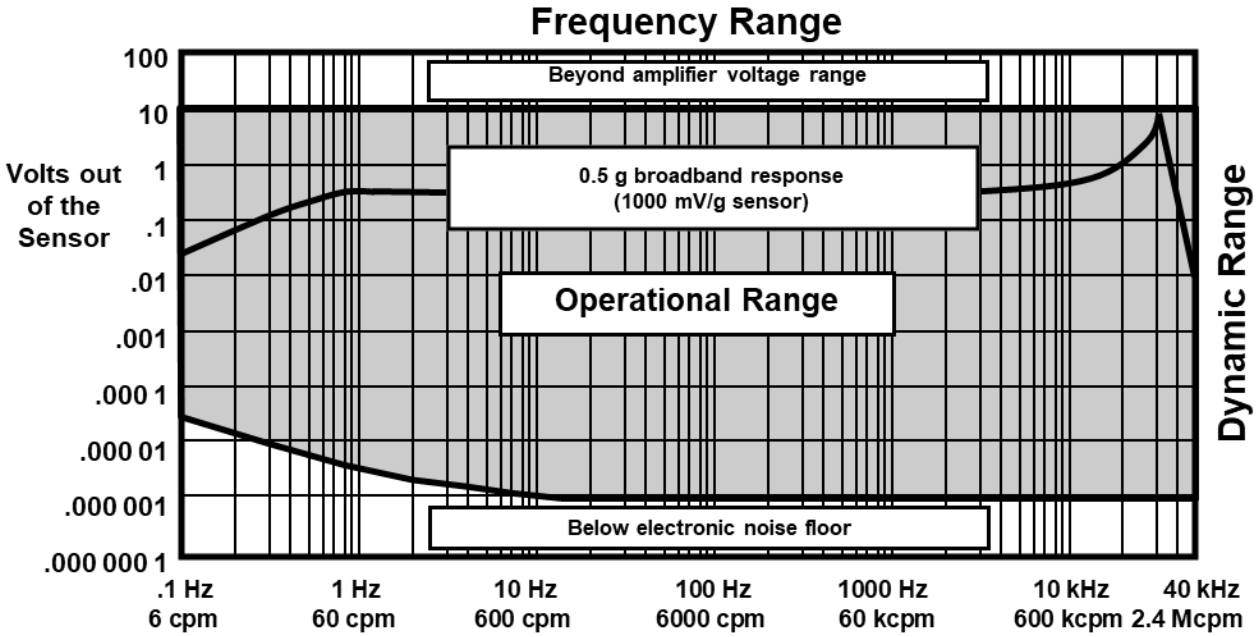


If the lowest natural frequency of the combined machine and support system in the direction of measurement is higher than its main excitation frequency (this is in most cases the rotational frequency) by at least 25 %, then the support system may be considered rigid in that direction. All other support systems may be considered flexible.

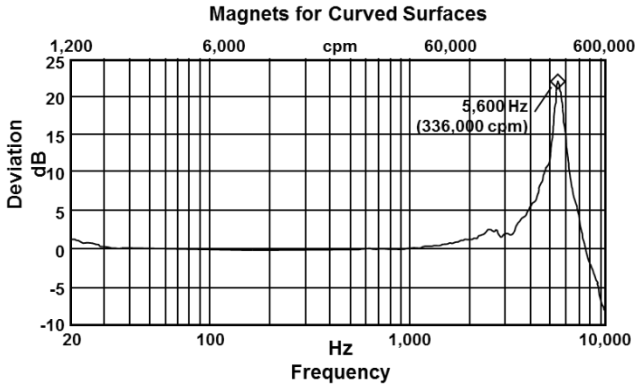
ISO 10816-3 Vibration Severity Chart



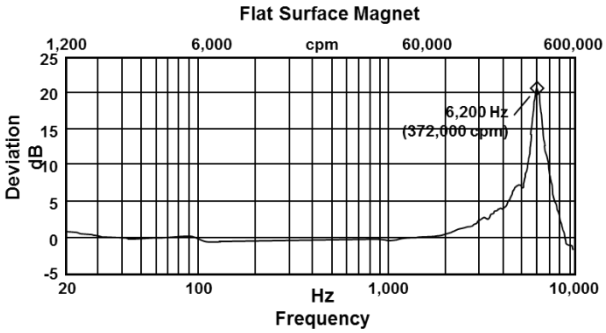
Transducer Operating Regions (트랜스듀스 운전 범위)



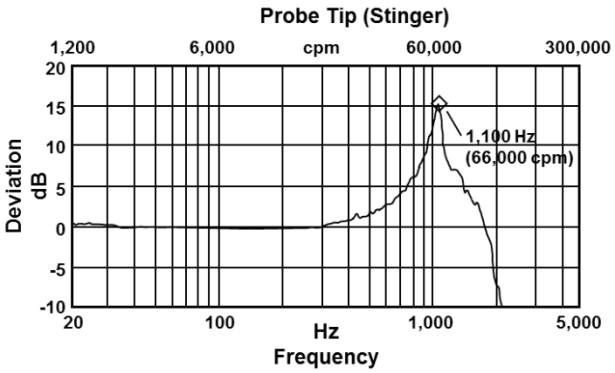
Transducer Frequency Response (주파수 응답) - Magnets on Curved Surfaces



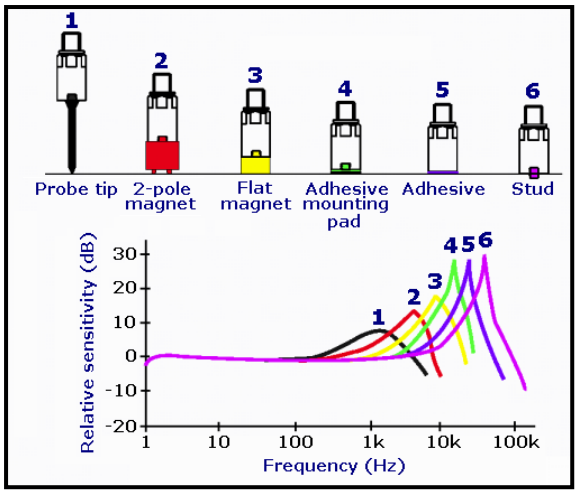
Transducer Frequency Response - Magnets on Flat Surfaces



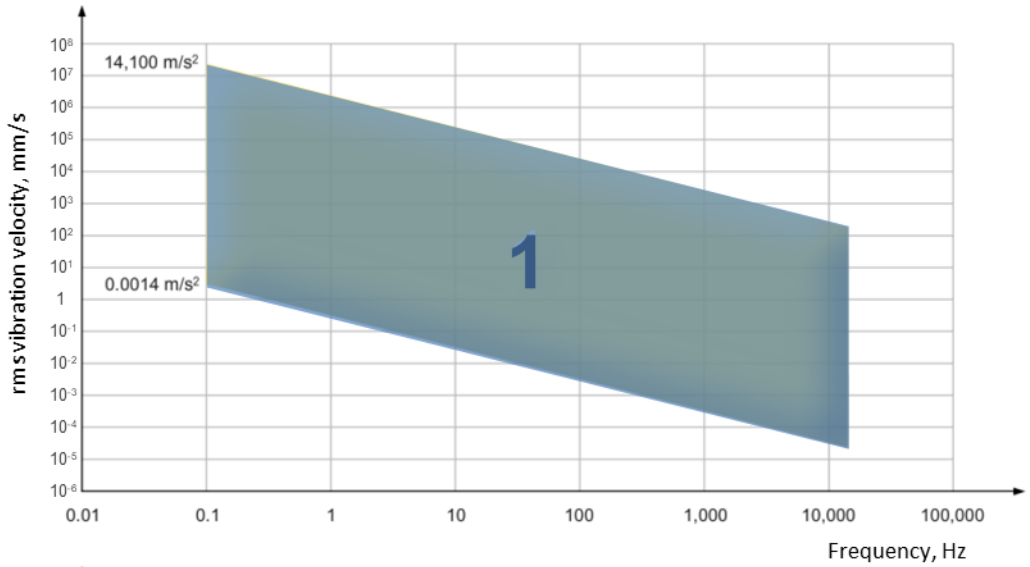
Transducer Frequency Response - Stingers or Hand Held Probes

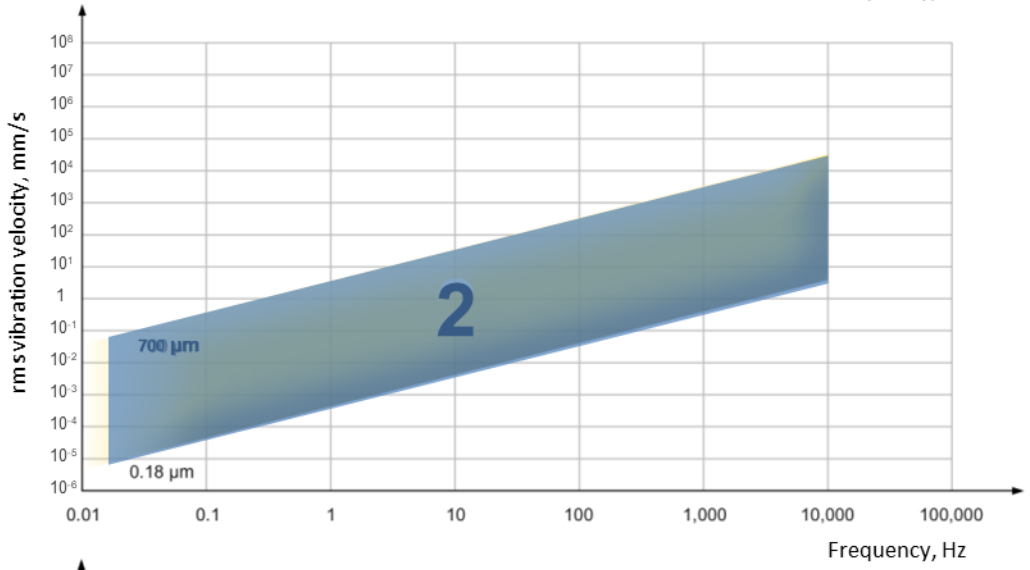


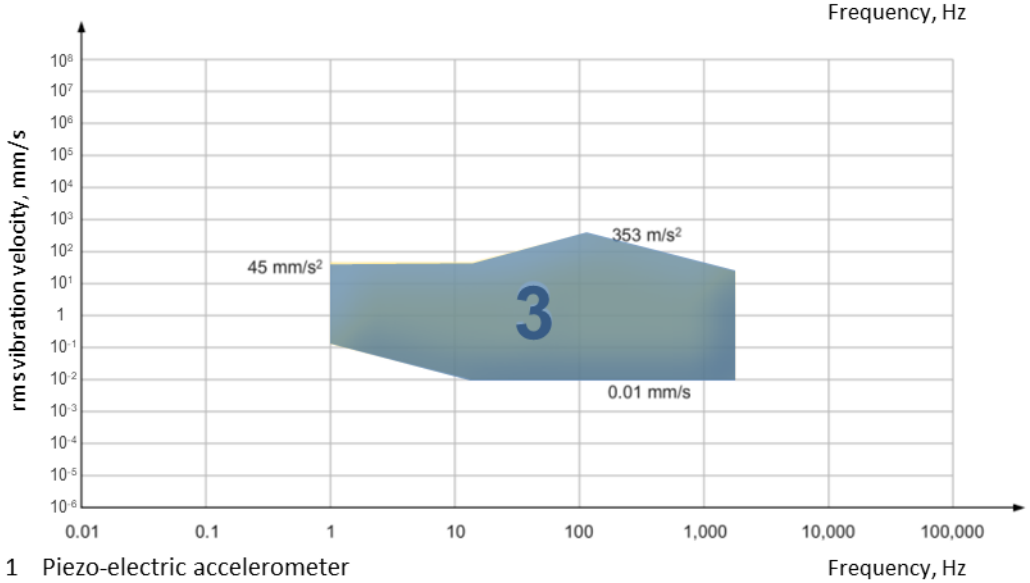
Transducer Frequency Response Curves (트랜스듀스의 주파수 응답 곡선)



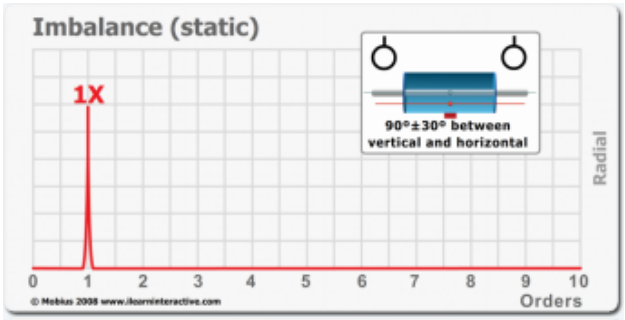
Transducer Effectiveness Regions (트랜스듀스의 효율적인 사용 범위)

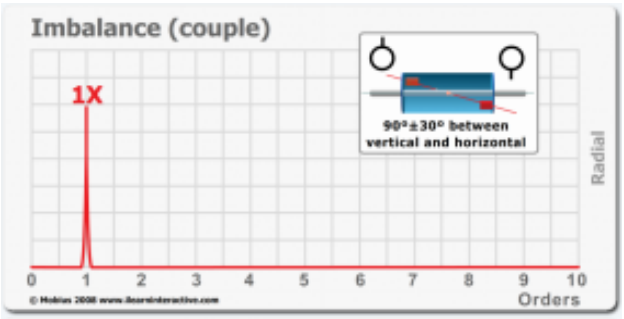


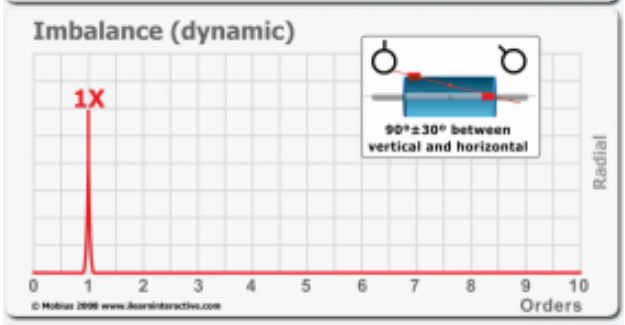


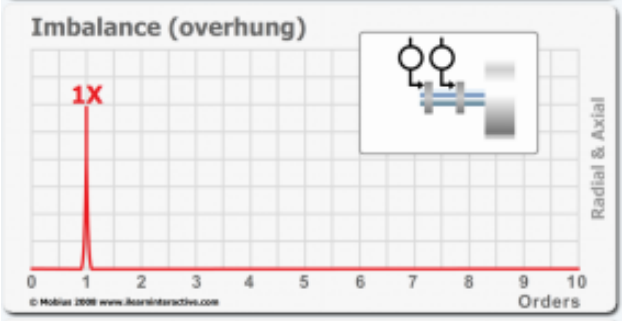


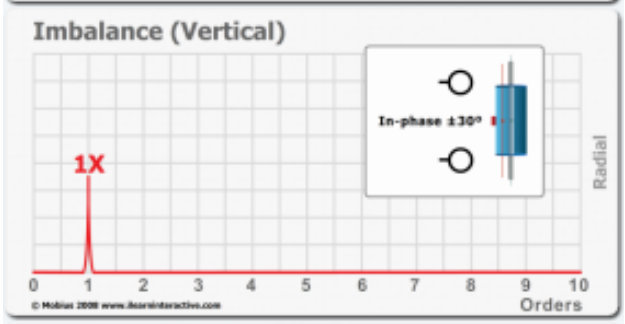
1 Piezo-electric accelerometer
2 Eddy-current proximity probe
3 Electro-mechanical velocity transducer

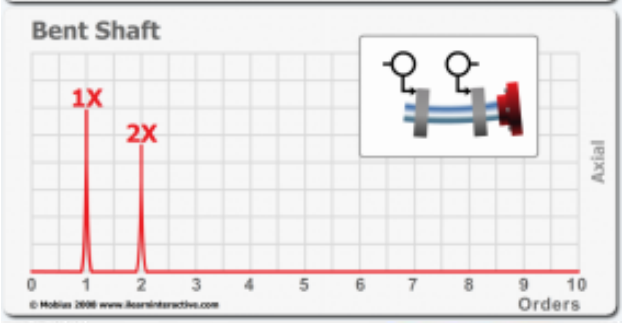


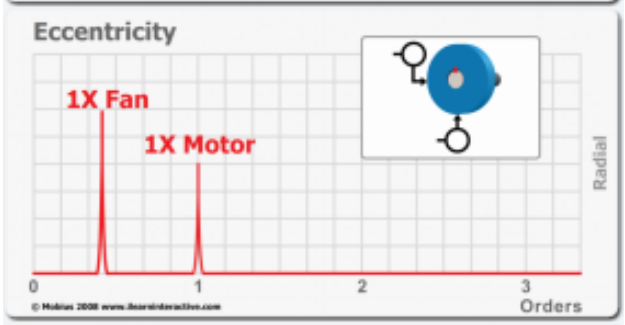


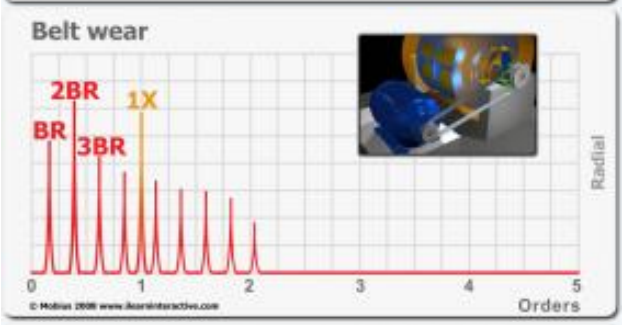


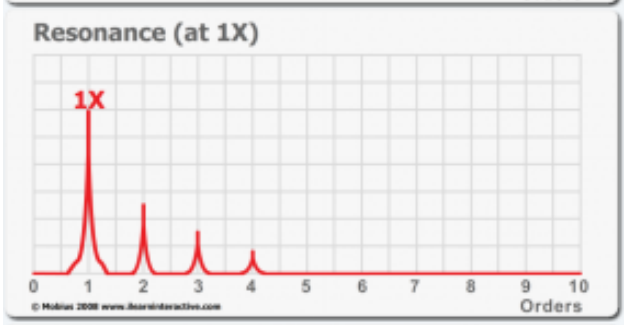


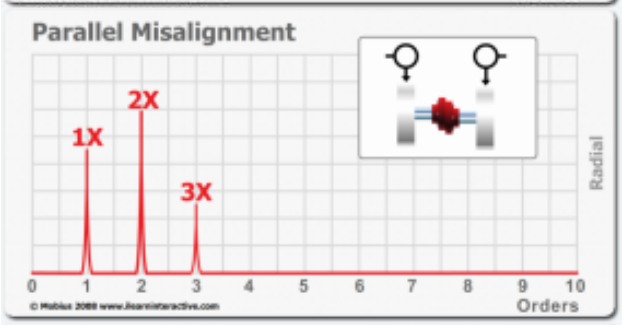


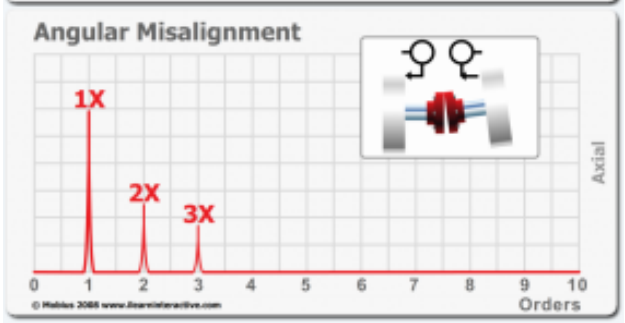


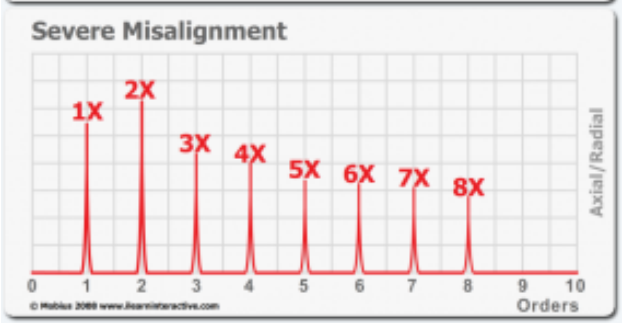


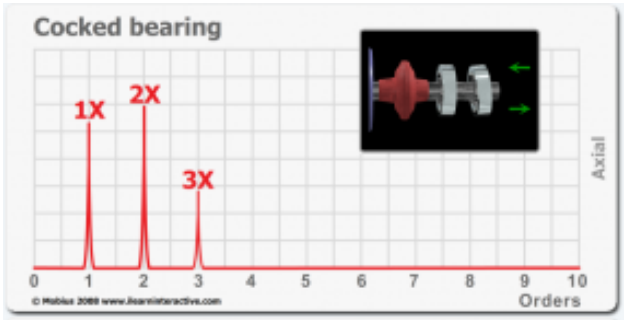


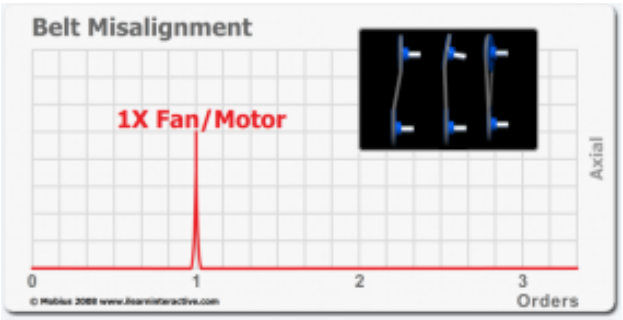


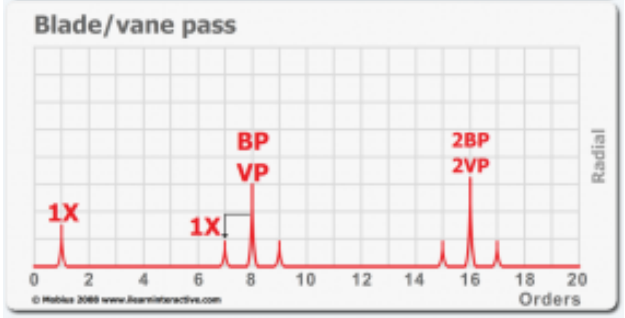


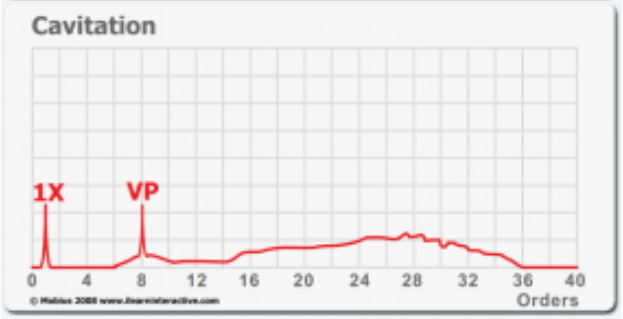


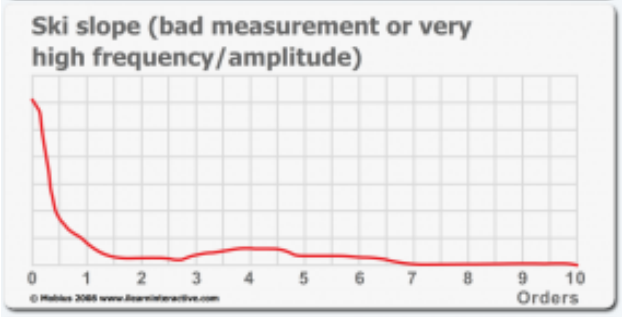


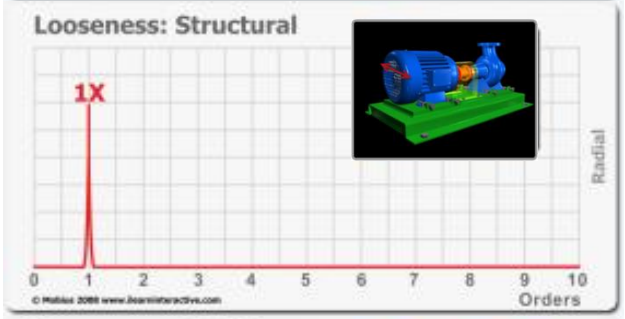


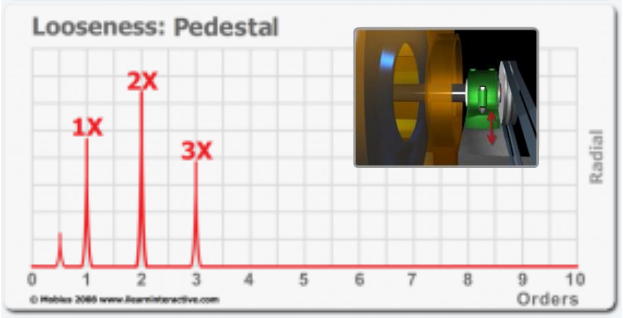


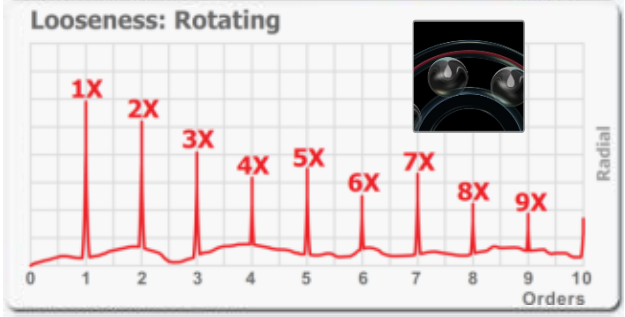


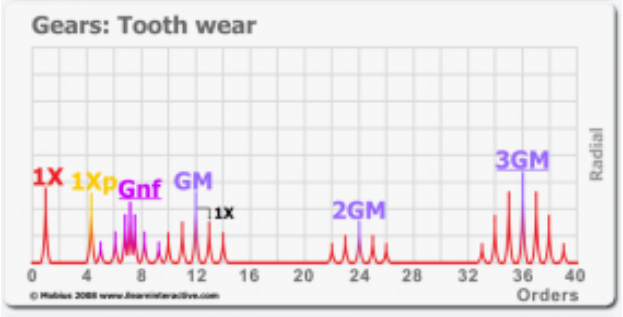


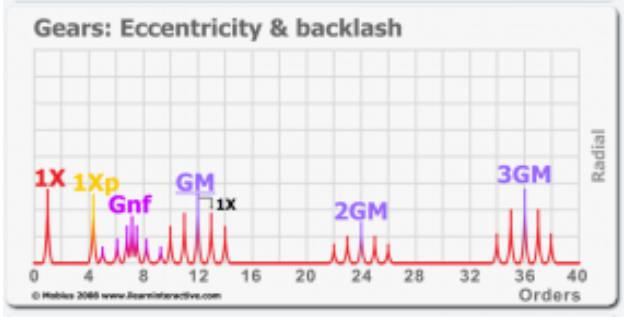


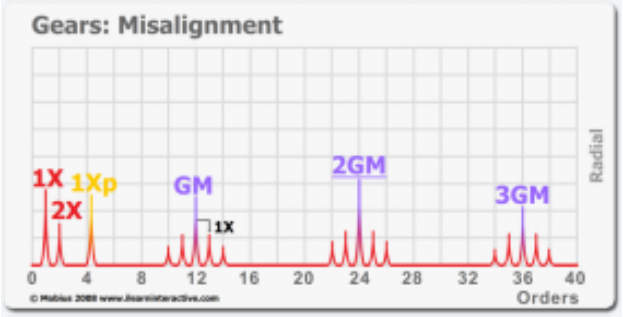


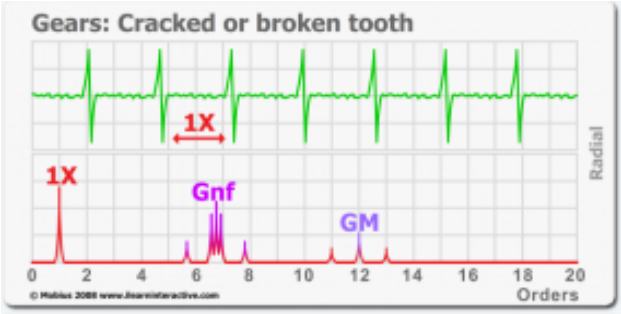


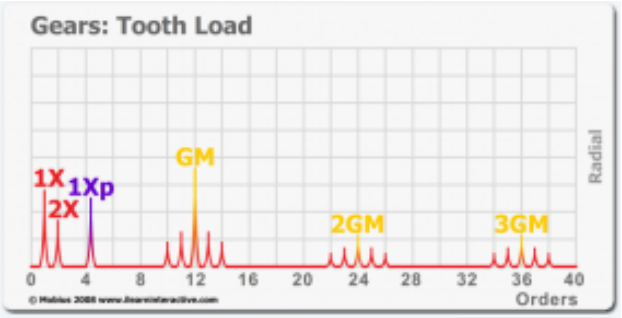


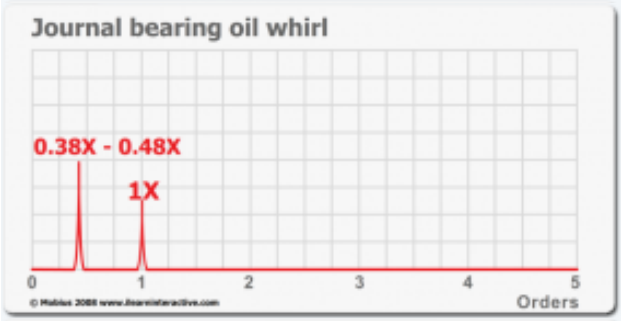


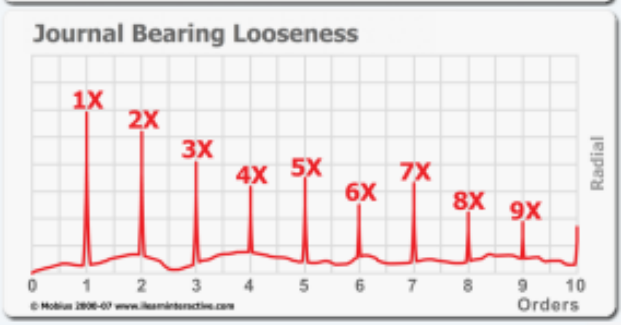


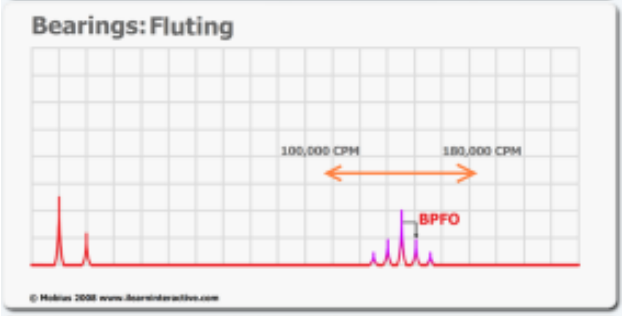


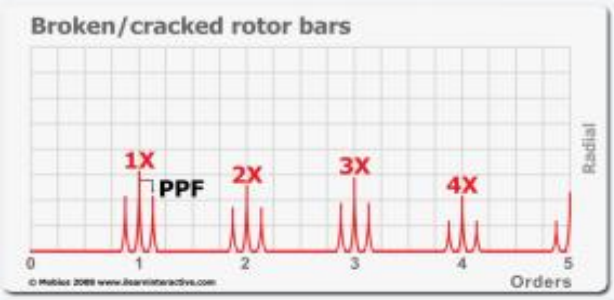


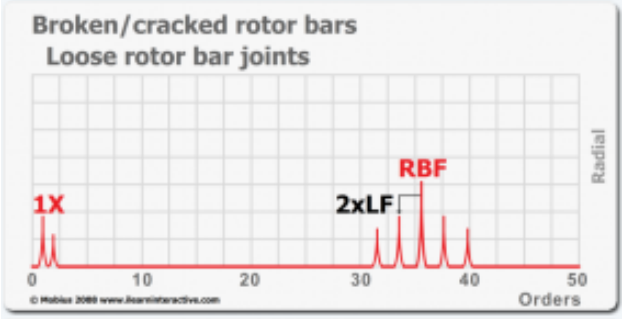


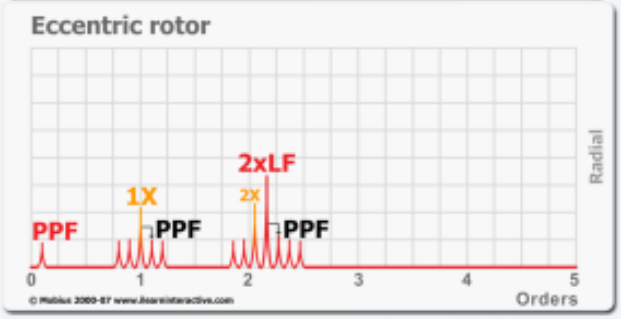


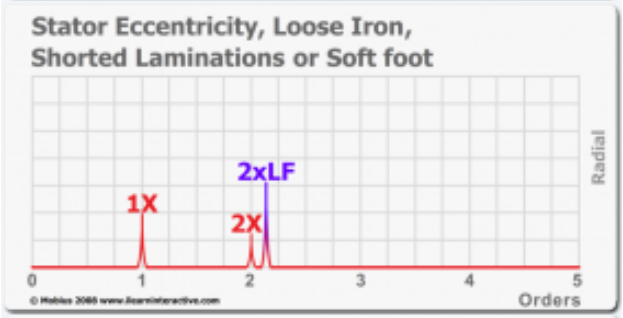


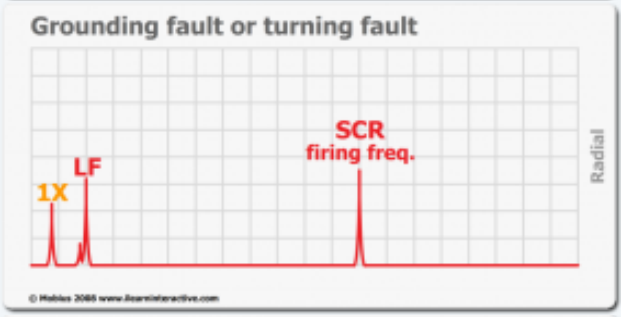


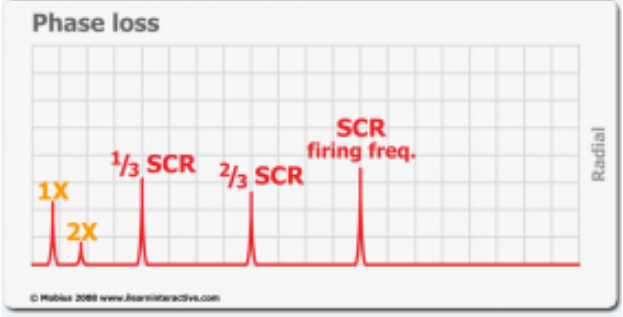


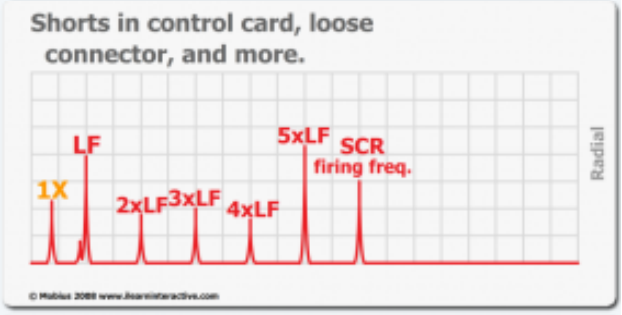


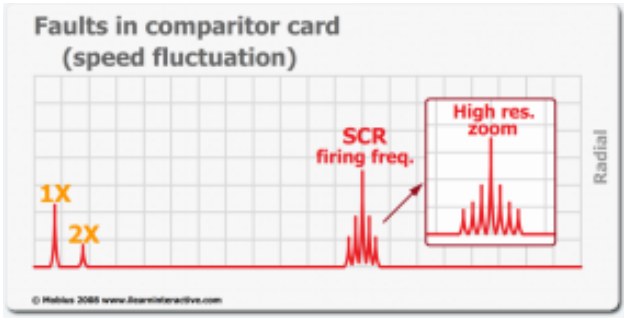


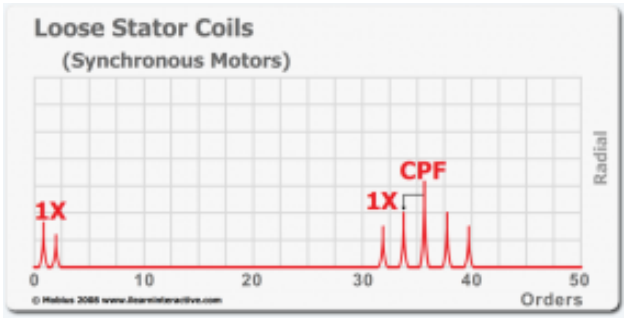


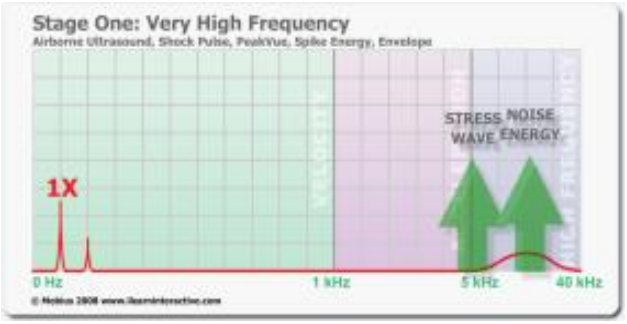




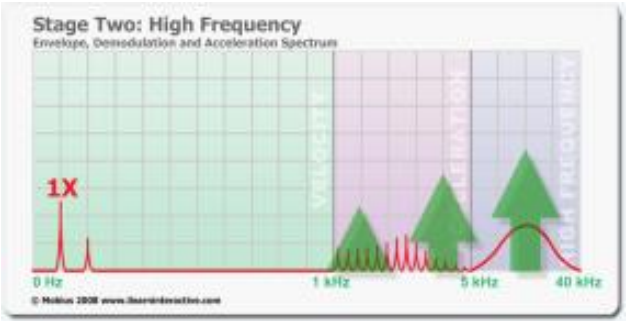




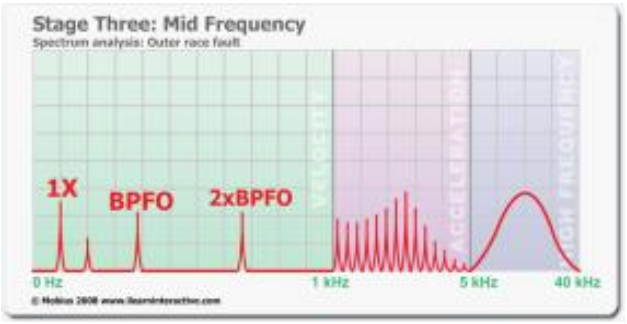




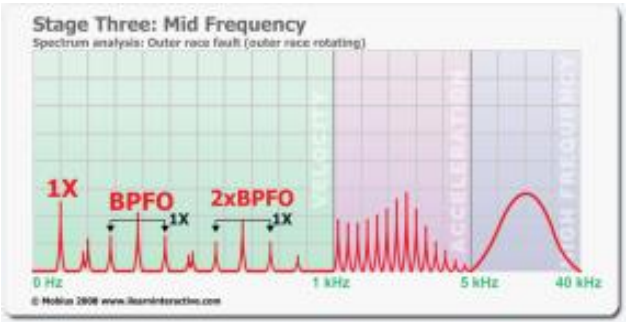
Stage One: Airborne Ultrasound, Shock Pulse, PeakVue, Spike Energy, Envelope



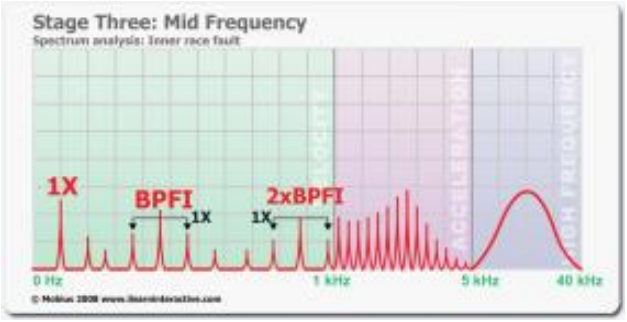
Stage Two: Envelope, Demodulation and Acceleration Spectrum



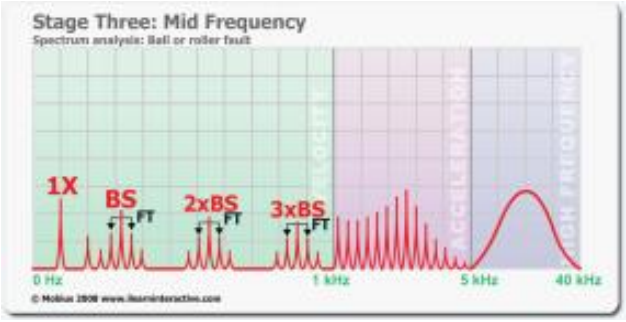
Stage Three: Outer race fault (inner race rotating)



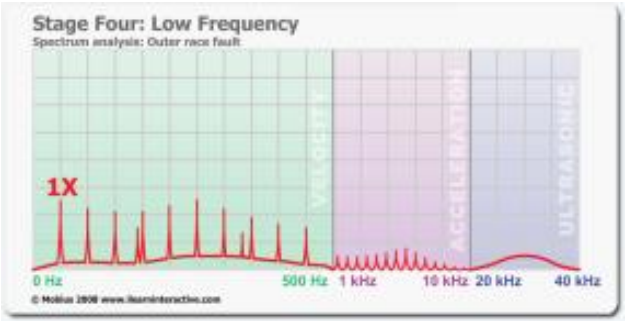
Stage Three: Outer race fault (outer race rotating)



Stage Three: Inner race fault (inner race rotating)



Stage Three: Ball or roller fault (inner race rotating)



Stage Four

This page intentionally left blank