

MATERIEL DE REFERENCE POUR L'EXAMEN DE CERTIFICATION

$$T = T_s \times N = \frac{N}{F_s} = \frac{N}{2.56 \times F_{max}} = \frac{\text{lignes}}{F_{max}}$$

T = Temps requis pour collecter la forme d'onde

T_s = Temps entre deux échantillons

F_s = Fréquence d'échantillonnage = Echantillons par seconde

N = Nombre d'échantillons (1024, 2048, 4096, etc.)

$$\text{Resolution} = \frac{F_{max}}{\text{lignes}}$$

$$\text{Largeur de Bande} = \text{Resolution} \times \text{Facteur de Fenêtre}$$

Facteur de Fenêtre = 1 (pas de fenêtre/uniforme/rectangulaire) ou 1.5 (Fenêtre Hanning)

Fréquence de séparation ≥ 2 x Largeur de bande ≥ 2 x Résolution * Facteur de fenêtre

Lignes spectrales requises ≥ 2 x facteur de fenêtre x Fmax / Fréquence de séparation

Précision de fréquence (au pic) = ± ½ x Résolution

Nombres premiers : 1, 2, 3, 5, 7, 11, 13, 17, 19...

1 inch/pouce = 25.4 mm

1mm = 0.039 inches/pouces

Calcul de la masse Test:

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

F = 10% de la masse du rotor divisé par le nombre de paliers, en kg

K = 0.011

N = RPM/1000

R = Rayon en cm

Conversions d'Unités

$D_{pk-pk} = \frac{19098 V_{pk}}{f_{cpm}} \quad V_{pk} = \frac{5217 A_{rms}}{f_{cpm}}$ $D_{pk-pk} = \frac{9.958 \times 10^7 A_{rms}}{f_{cpm}^2} \quad A_{rms} = \frac{f_{cpm} V_{pk}}{5217}$ $V_{pk} = \frac{f_{cpm} D_{pk-pk}}{19098} \quad A_{rms} = \frac{f_{cpm}^2 D_{pk-pk}}{9.958 \times 10^7}$	$D_{pk-pk} = \frac{27009 V_{rms}}{f_{cpm}} \quad V_{rms} = \frac{93712 A_{rms}}{f_{cpm}}$ $D_{pk-pk} = \frac{2.53 \times 10^9 A_{rms}}{f_{cpm}^2} \quad A_{rms} = \frac{f_{cpm} V_{rms}}{93712}$ $V_{rms} = \frac{f_{cpm} D_{pk-pk}}{27009} \quad A_{rms} = \frac{f_{cpm}^2 D_{pk-pk}}{2.53 \times 10^9}$
<p>D = Déplacement : mils pk-pk V = Vitesse : in/sec pk A = Accélération: g rms F = Fréquence: CPM</p>	<p>D = Déplacement: micron pk-pk V = Vitesse: mm/sec rms A = Accélération: g rms F = Fréquence: CPM 1g rms = 9.8m/sec²</p>

ISO 10816-3 Vibration Severity Chart

				Vitesse	
				10-1000Hz > 600rpm	2-1000Hz > 120rpm
				11	0.43
	D			7.1	0.28
		C		4.5	0.18
			B	3.5	0.14
				2.8	0.11
				2.3	0.09
			A	1.4	0.06
				0.71	0.03
				mm/s rms	inch/s rms
rigide	flexible	rigide	flexible	Fondation/Châssis	
Machines intermédiaires 15kW < P ≤ 300kW		Grandes machines 300kW < P < 50MW		Ty de Machine	
Moteurs 160mm ≤ H < 315mm		Moteurs 315mm ≤ H			
Groupe 2		Groupe 1		Groupe	

- A Etat de la machine neuve
- B Zone de fonctionnement sur le long terme
- C Zone de fonctionnement sur le court terme
- D La vibration génère des dommages

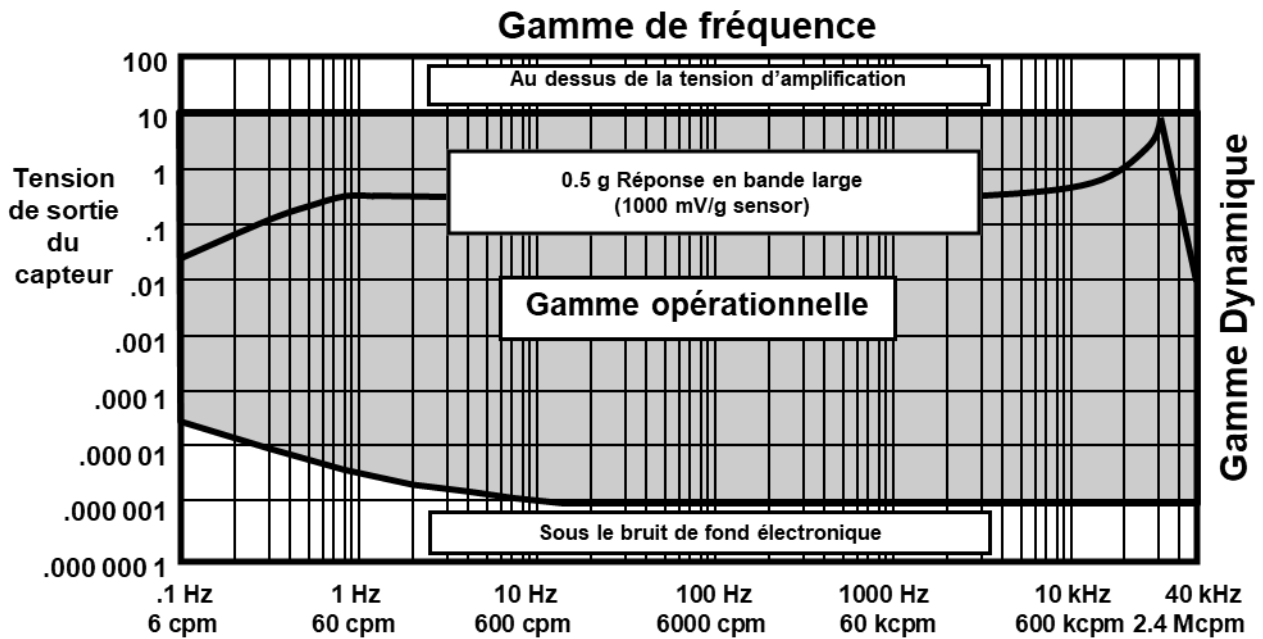
If the lowest natural frequency of the combined machine and support system in the direction of measurement is higher than its main excitation frequency (this is in most cases the rotational frequency) by at least 25 %, then the support system may be considered rigid in that direction. All other support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

ISO 10816-3 Vibration Severity Chart

				140	5.51	Déplacement 10-1000Hz r > 600rpm 2-1000Hz r > 120rpm μm rms mil rms
				113	4.45	
				90	3.54	
				71	2.80	
				57	2.24	
				45	1.77	
				37	1.46	
				29	1.14	
				22	0.87	
				18	0.71	
				11	0.43	
rigide	flexible	rigide	flexible	Fondation/Châssis		
Machines intermédiaires 15kW < P ≤ 300kW		Grandes machines 300kW < P < 50MW		Ty de Machine		
Moteurs 160mm ≤ H < 315mm		Moteurs 315mm ≤ H				
Groupe 2		Groupe 1		Groupe		

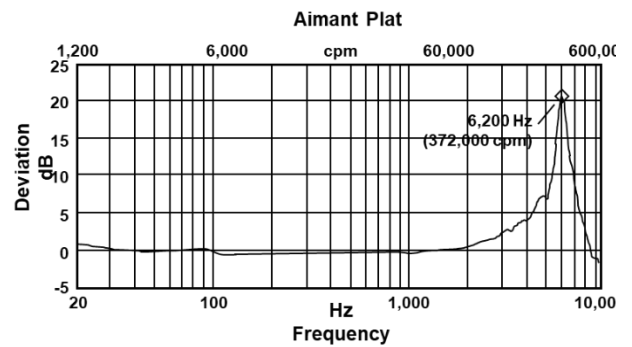
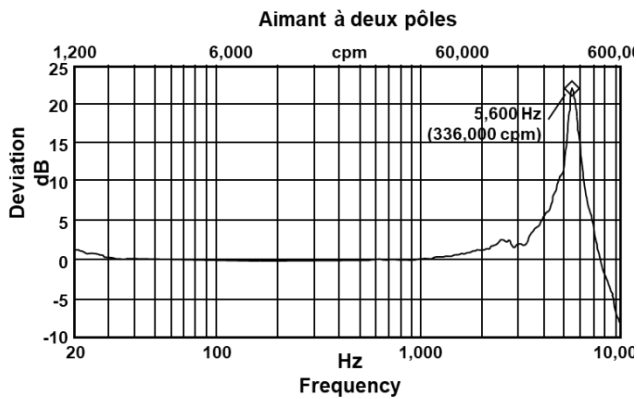
- A Etat de la machine neuve
- B Zone de fonctionnement sur le long terme
- C Zone de fonctionnement sur le court terme
- D La vibration génère des dommages

Régions Opérationnelle du Capteur

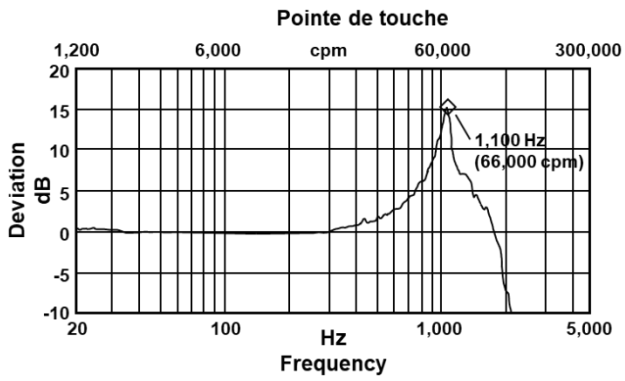


Réponse en Fréquence du Capteur – Aimant à 2 pôles

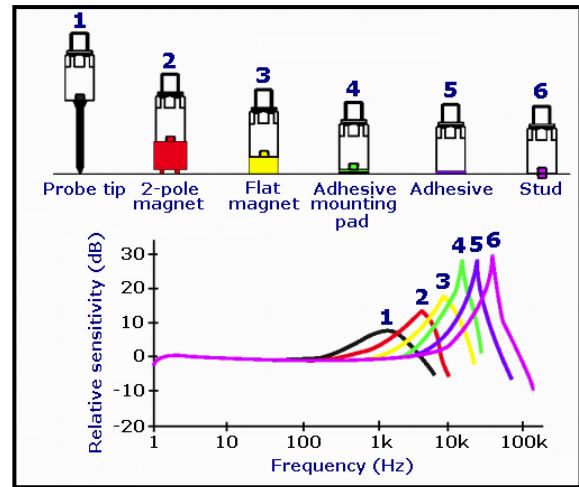
Réponse en Fréquence du Capteur – Aimant plat



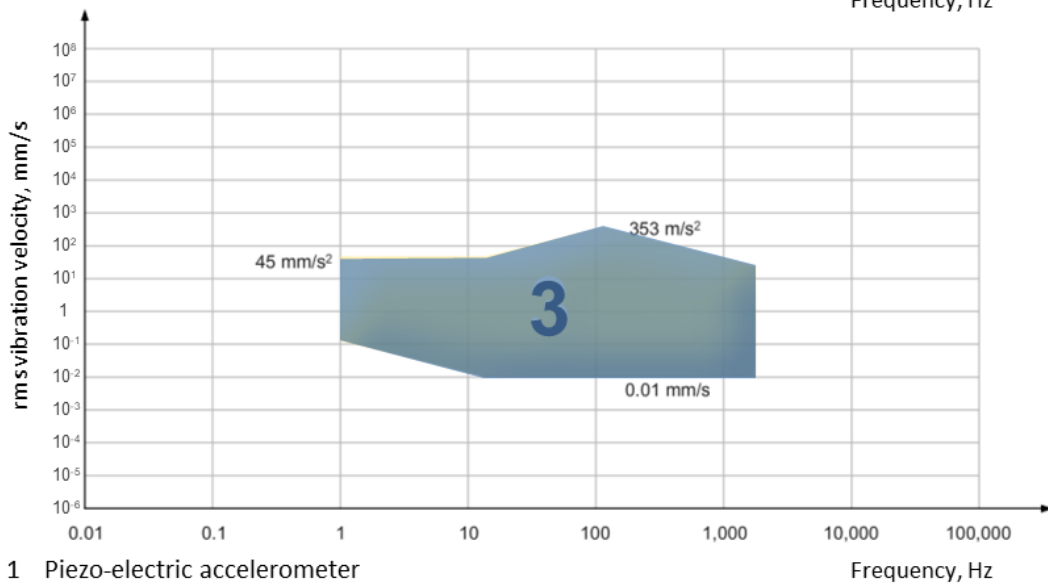
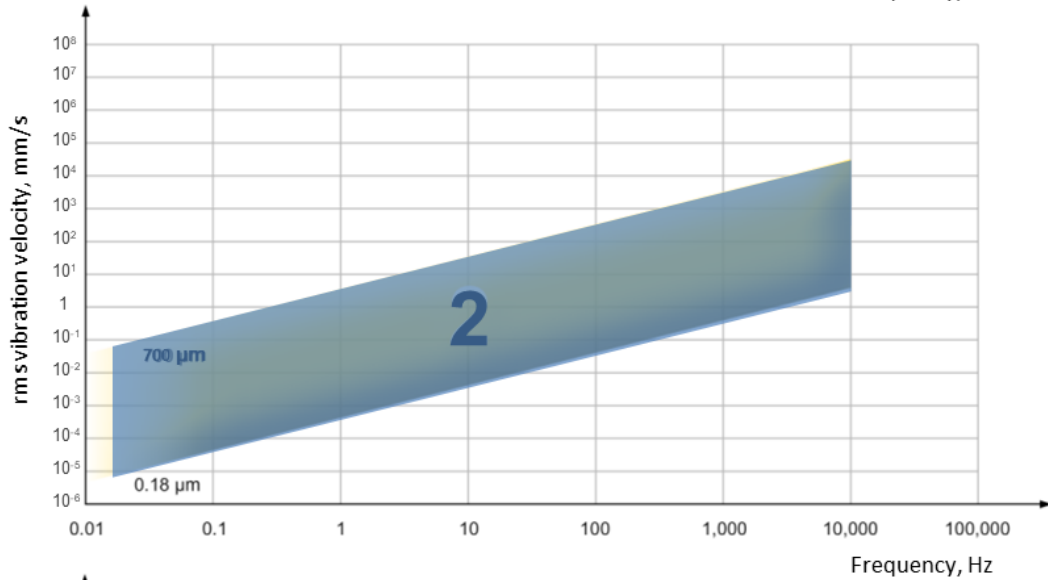
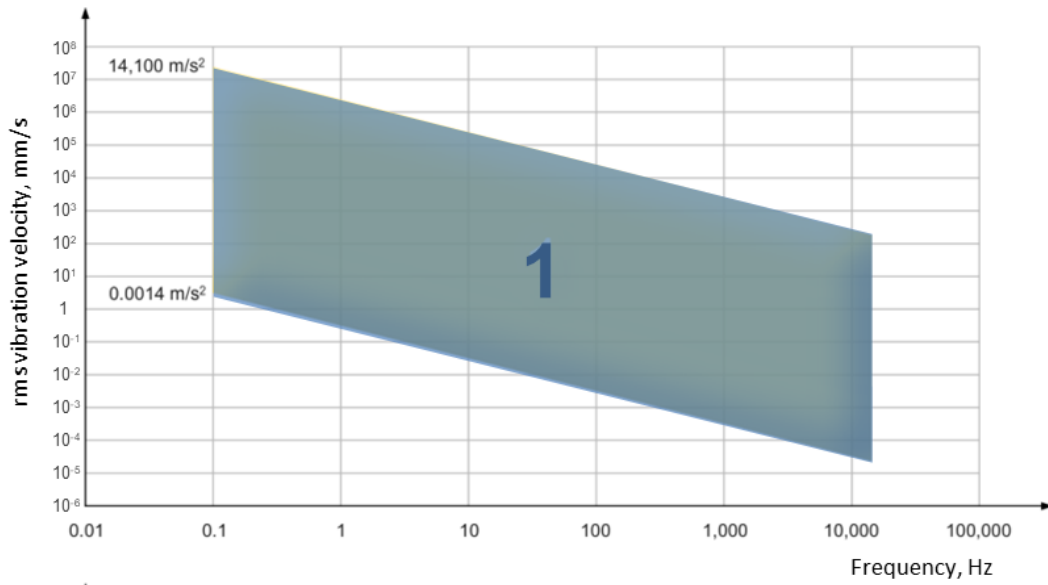
Réponse en Fréquence du Capteur – Pointe de touche



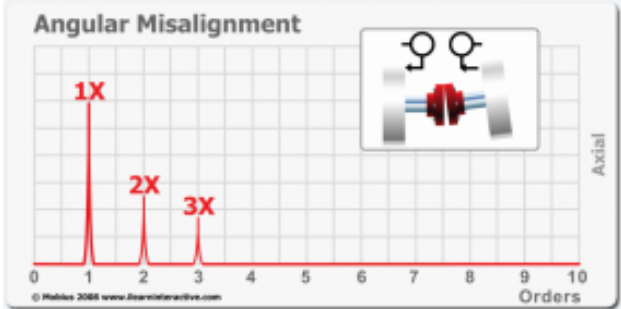
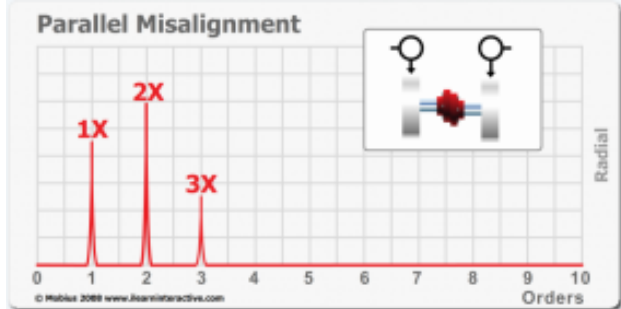
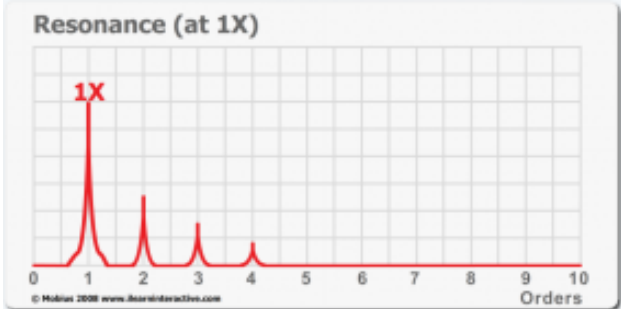
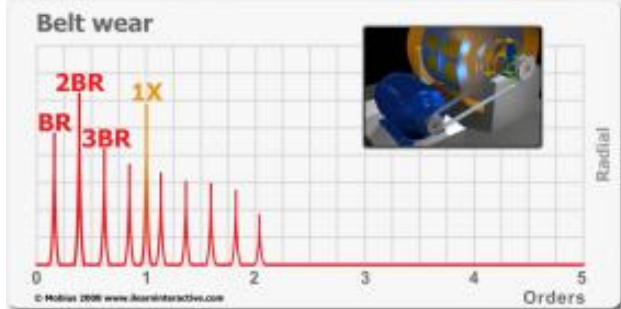
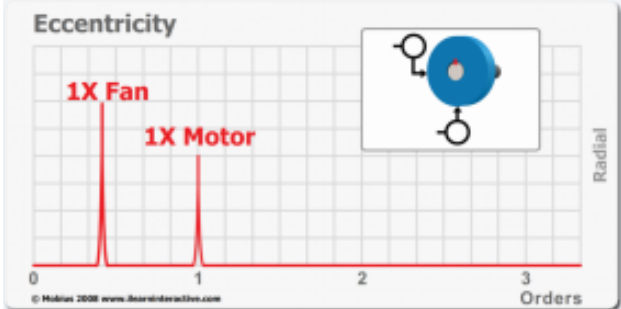
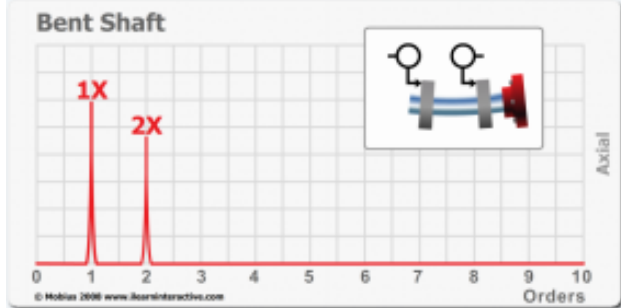
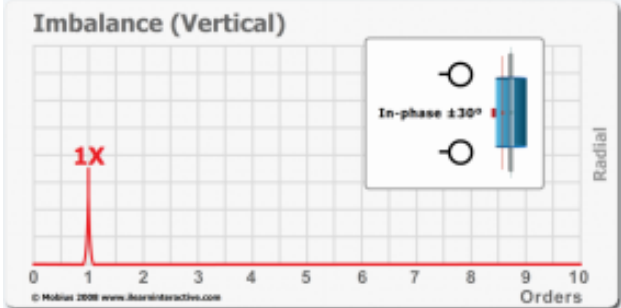
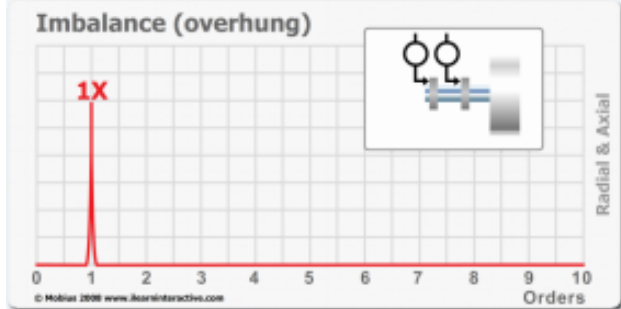
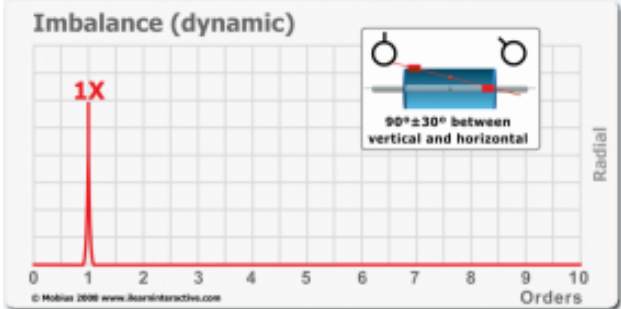
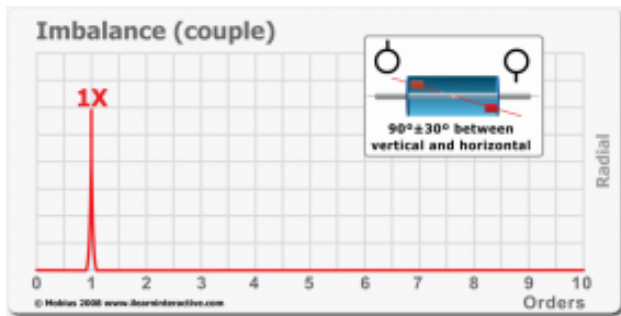
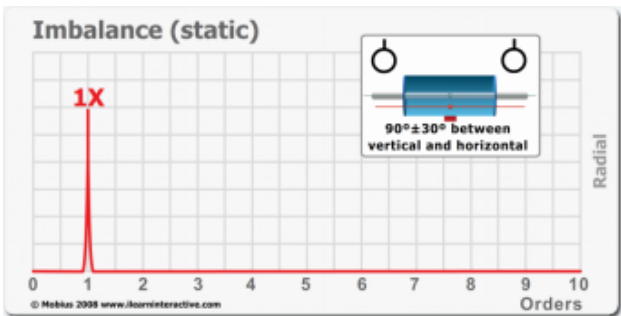
Courbes de Réponse en Fréquence du Capteur

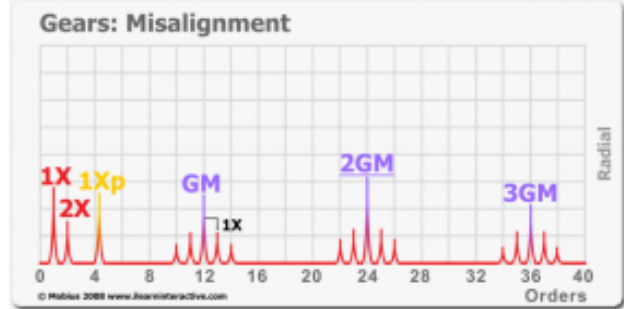
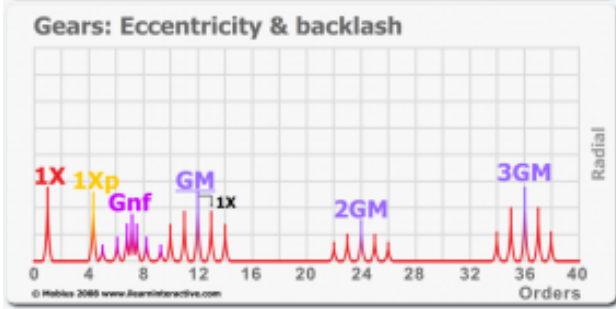
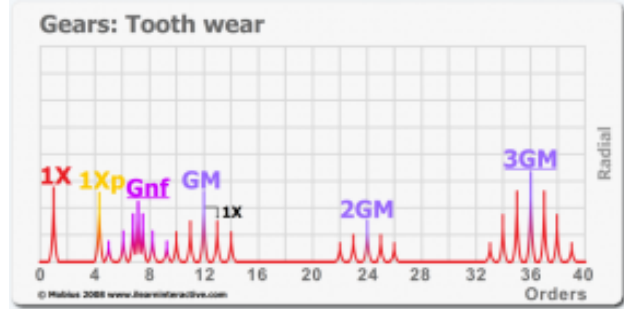
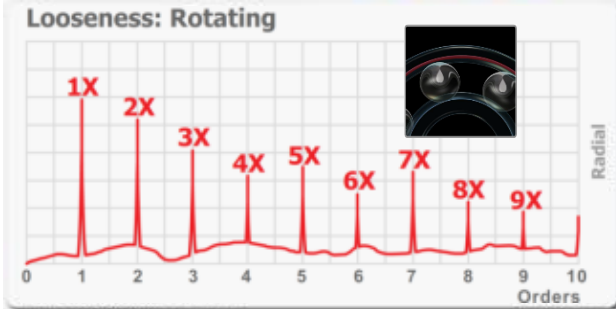
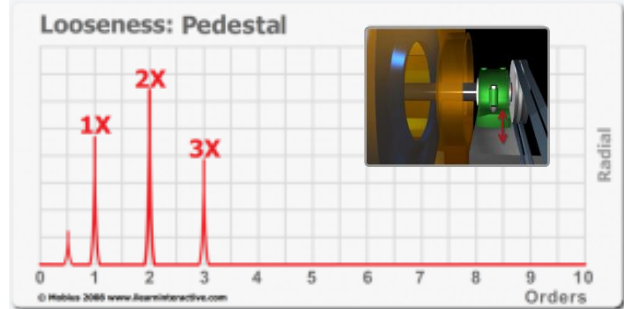
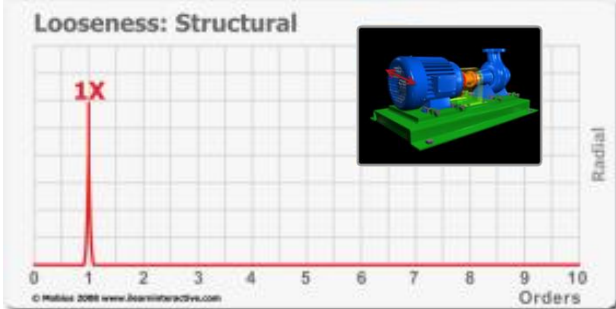
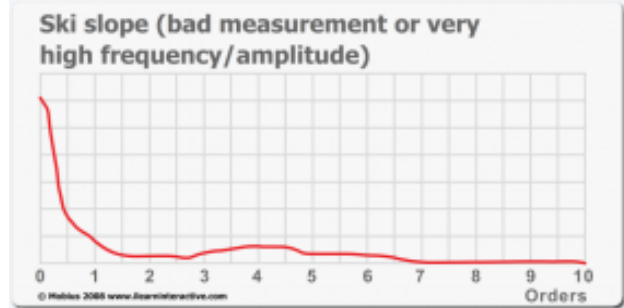
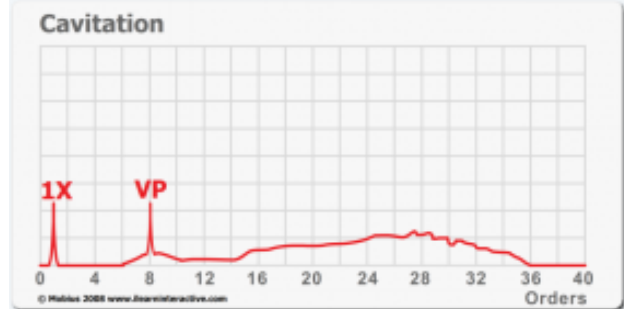
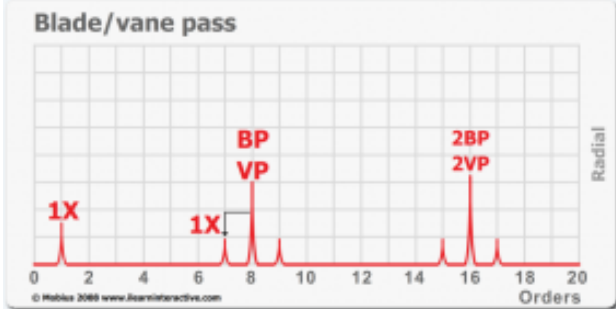
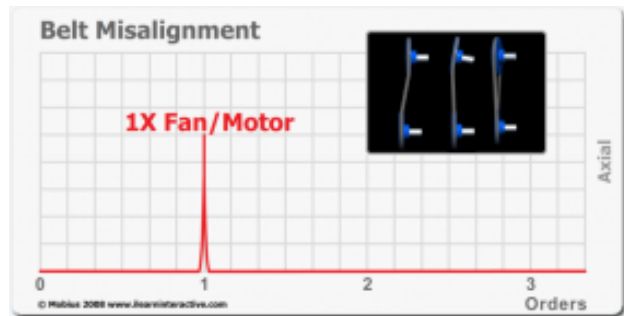
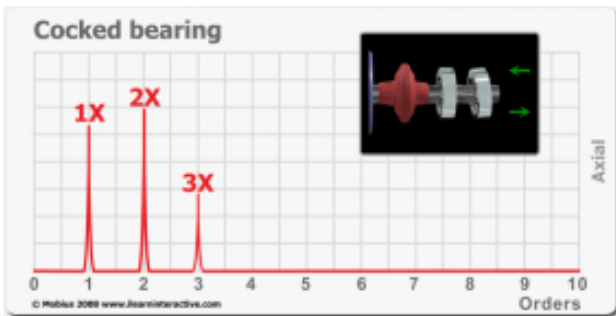


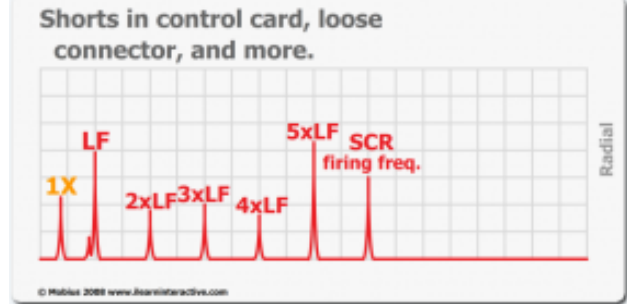
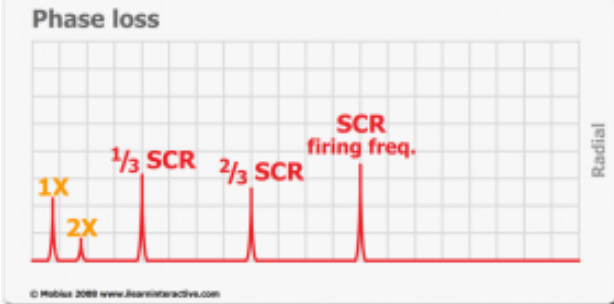
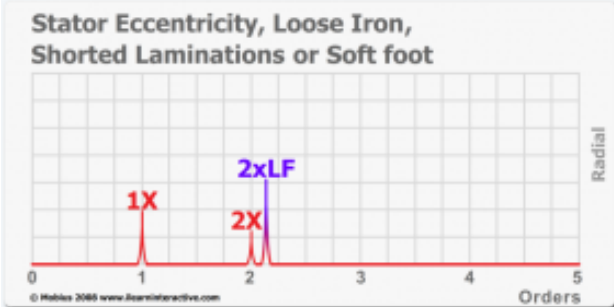
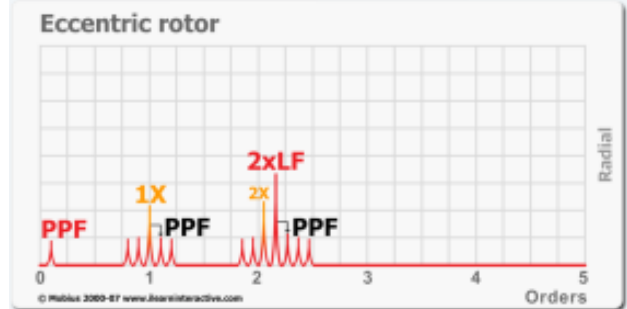
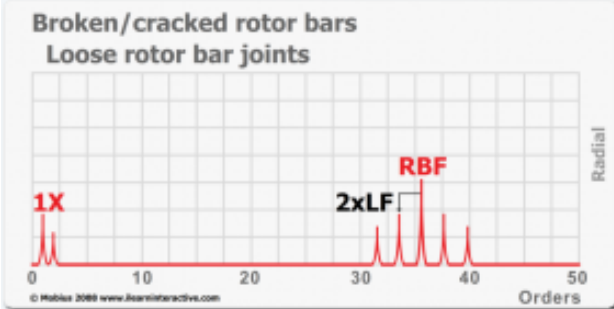
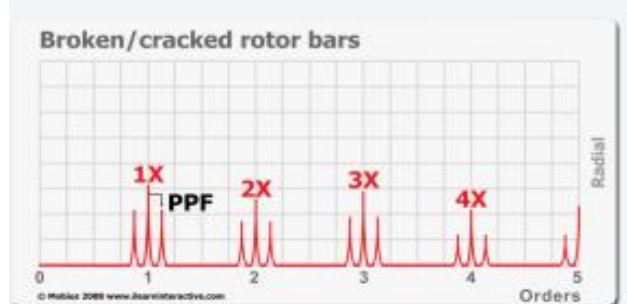
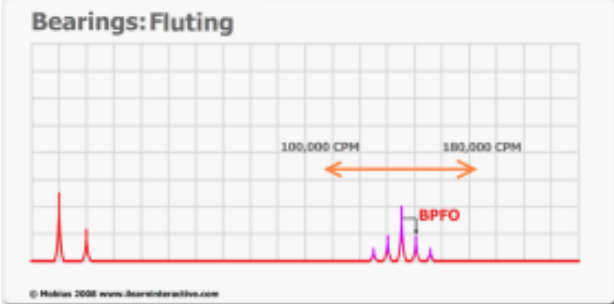
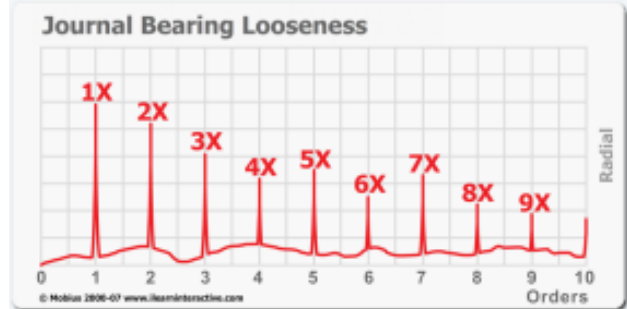
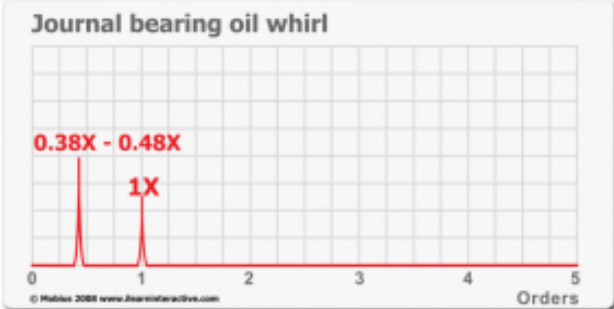
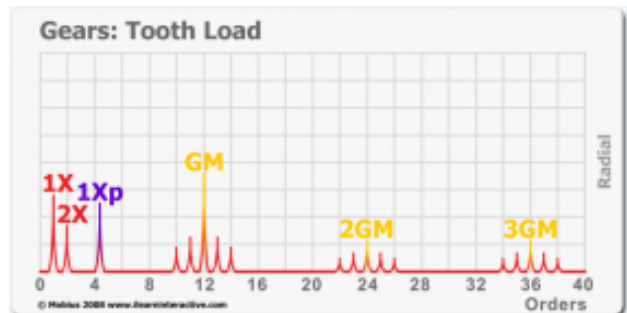
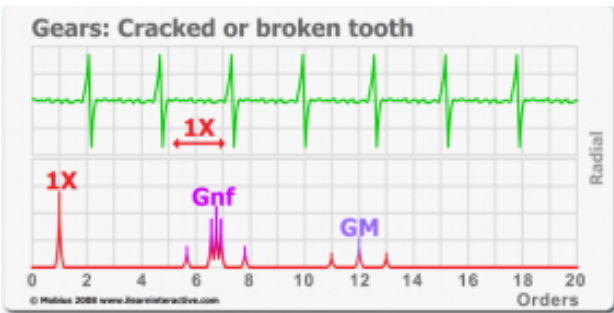
Régions d'efficacité du Capteur

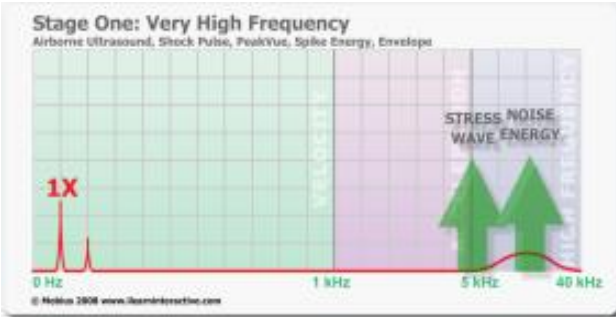
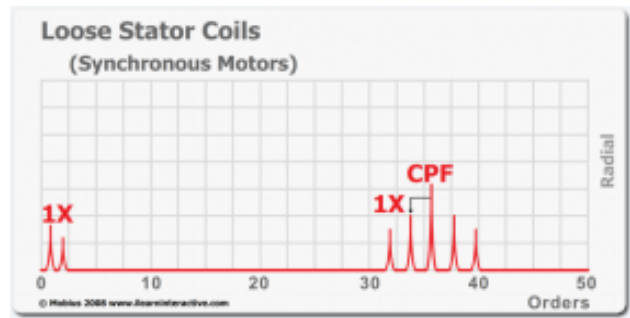
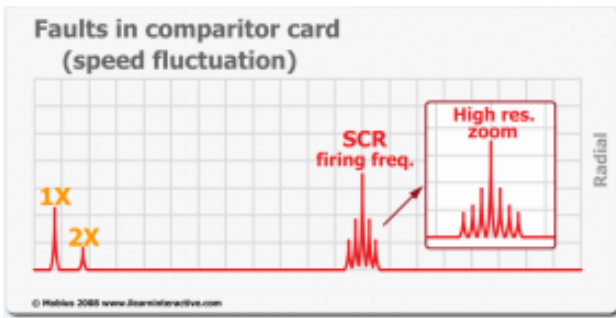


- 1 Piezo-electric accelerometer
- 2 Eddy-current proximity probe
- 3 Electro-mechanical velocity transducer

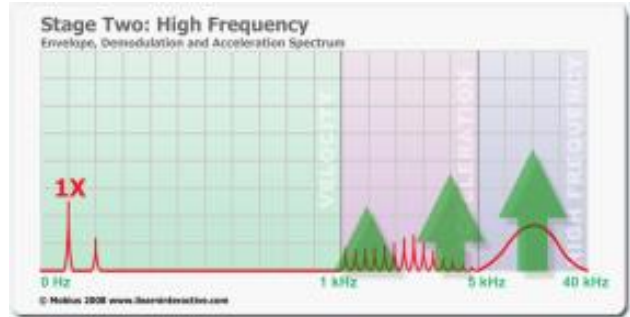




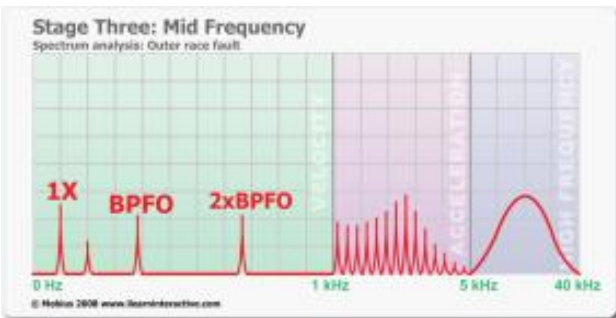




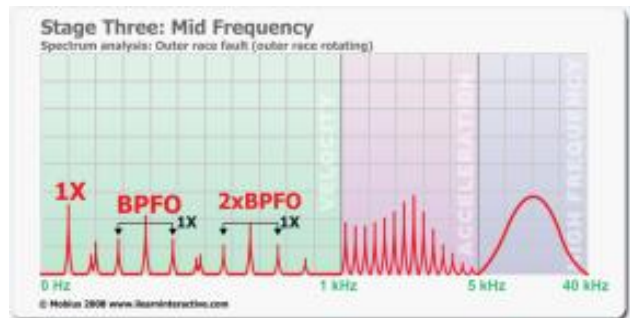
Stage One: Airborne Ultrasound, Shock Pulse, PeakVue, Spike Energy, Envelope



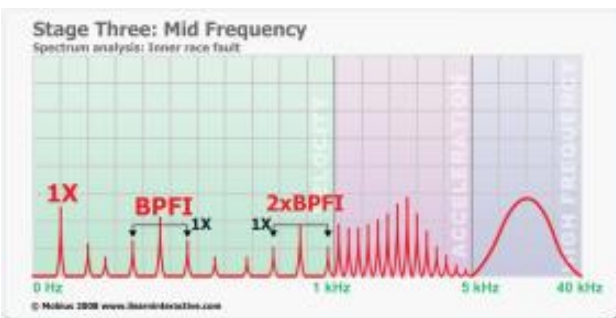
Stage Two: Envelope, Demodulation and Acceleration Spectrum



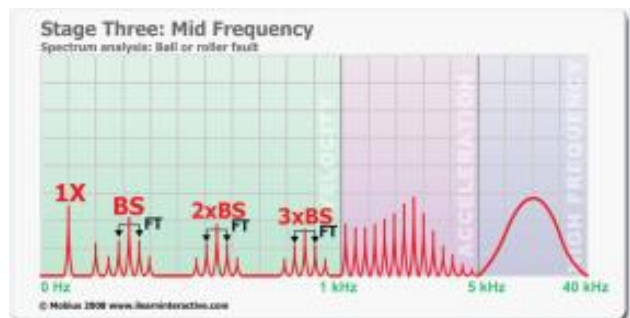
Stage Three: Outer race fault (inner race rotating)



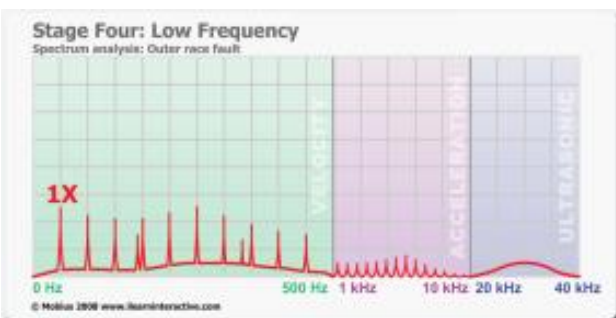
Stage Three: Outer race fault (outer race rotating)



Stage Three: Inner race fault (inner race rotating)



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



Stage Four

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