

REFERENTNI MATERIJAL ZA ISPIT

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

T = Vreme potrebno za prikupljanje vremenskog bloka

T_s = Vreme između dva uzorka

F_s = Brzina uzorkovanja (frekvencija digitalizacije) = Uzoraka po sekundi

N = Broj uzoraka (1024, 2048, 4096 itd.)

$$\text{Rezolucija} = \frac{F_{max}}{\text{broj linija}}$$

$$\text{Stvarna rezolucija (eng. Bandwidth)} \\ = \text{Rezolucija} \times \text{prozorski faktor}$$

Prozorski faktor = 1 (bez prozora/uniformni/pravougaoni) ili 1.5 (Hanning)

Rastojanje između dve frekventne komponente $\geq 2 \times$ Stvarna rezolucija $\geq 2 \times$ Rezolucija *
prozorski faktor

Potrebni broj spektralnih linija $\geq 2 \times$ prozorski faktor \times F_{max} / rastojanje između dve
frekventne komponente

Frekventna tačnost (na peak-u) = $\pm \frac{1}{2} \times$ Rezolucija

Prosti brojevi: 1, 3, 5, 7, 11, 13, 17, 19...

1 inch = 25.4 mm

1mm = 0.039 inches

Izračunavanje veličine probnog tega:

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

F = 10% mase rotora (kg) podeljena sa brojem ležajeva.

K = 0.011

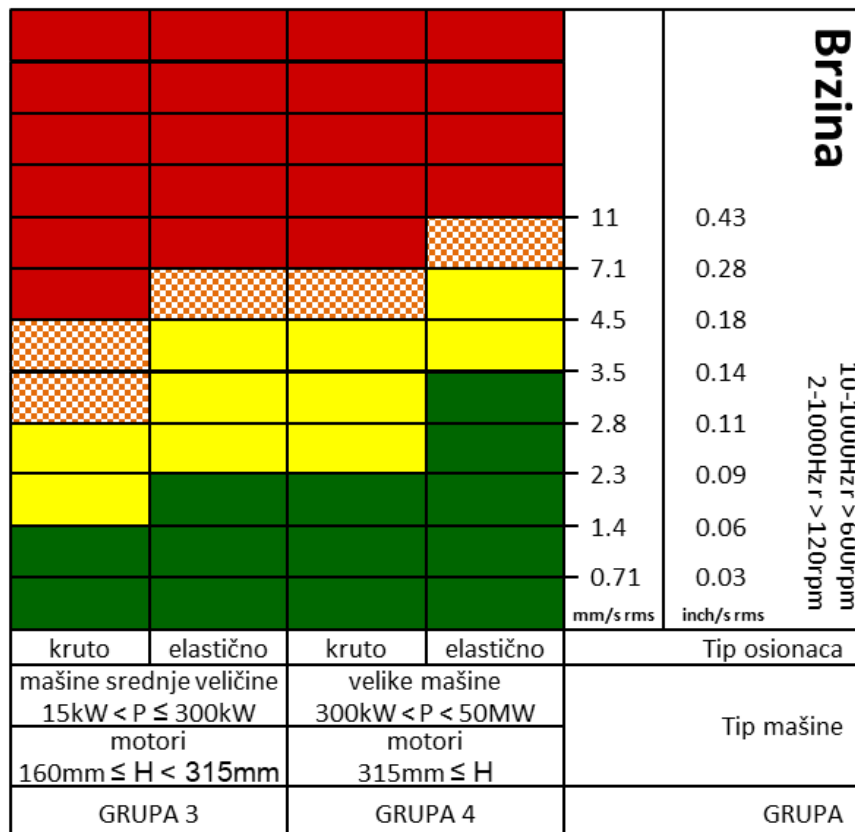
N = RPM/1000

R = Radijus u cm

Konverzija jedinica

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

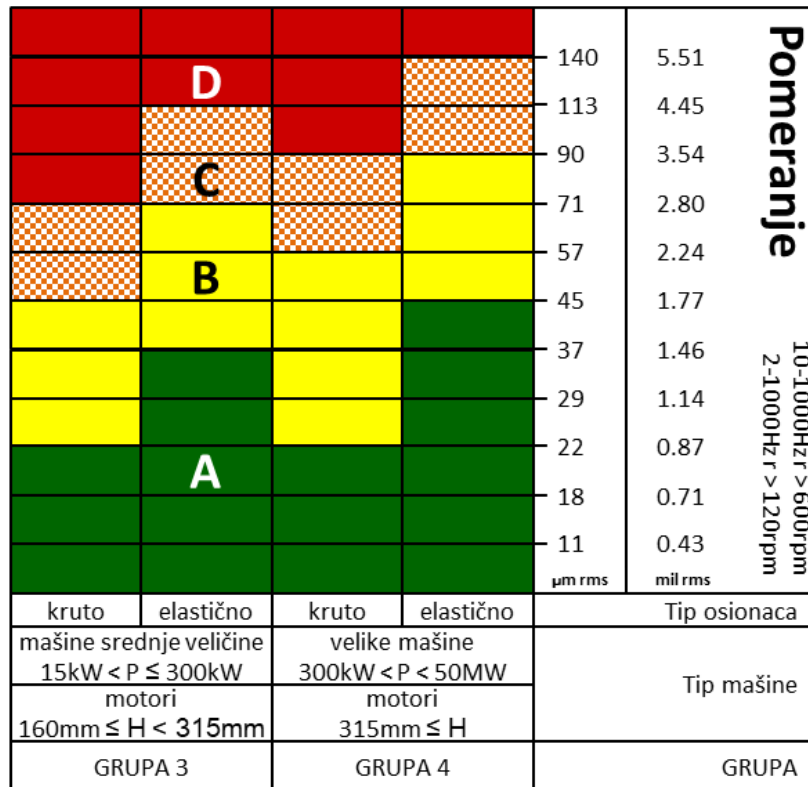
ISO 10816-3 Dijagram kritičnih nivoa vibracija



- A Nova mašina
- B Neograničeno dug rad mašine dozvoljen
- C Rad mašine u kraćem periodu dozvoljen
- D Nedozvoljen rad

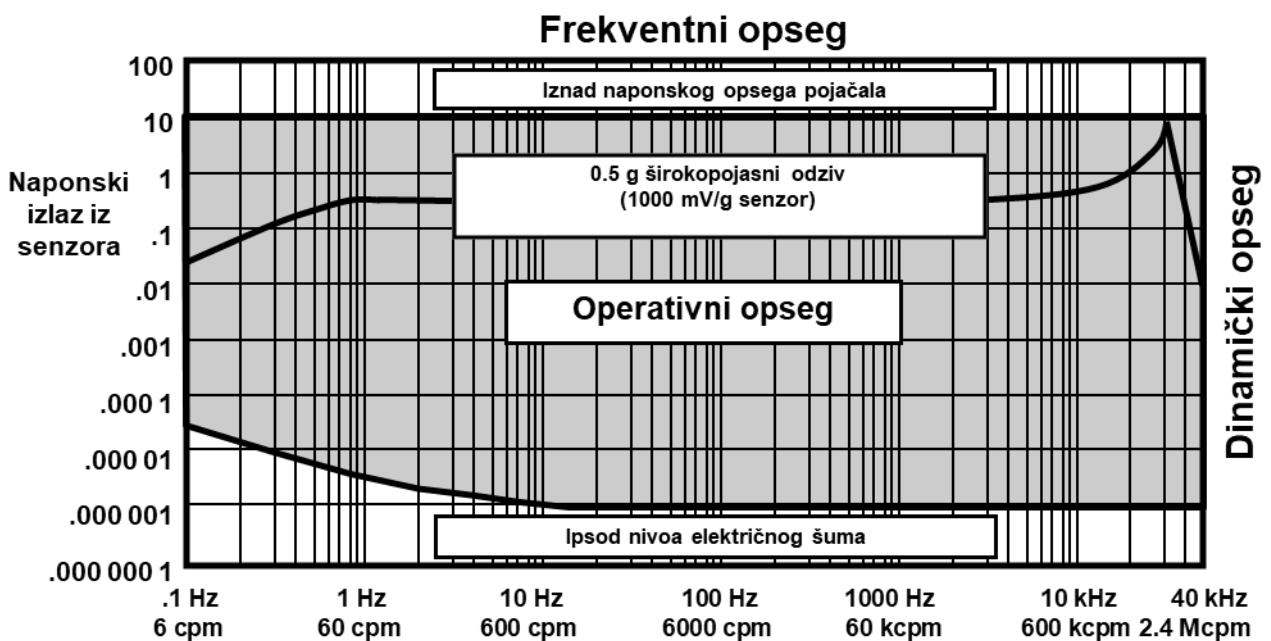
If the lowest natural frequency of the combined machine and support system in the direction of measurement is higher than its main excitation frequency (this is in most cases the rotational frequency) by at least 25 %, then the support system may be considered rigid in that direction. All other support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

ISO 10816-3 Dijagram kritičnih nivoa vibracija

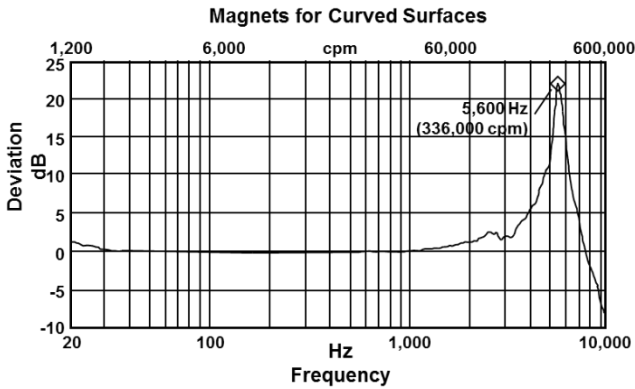


- A Nova mašina
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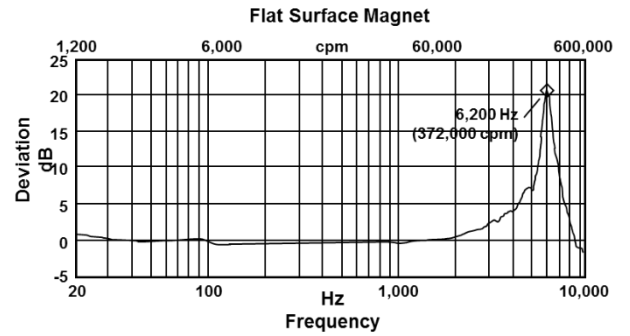
Korisni opsezi rada senzora



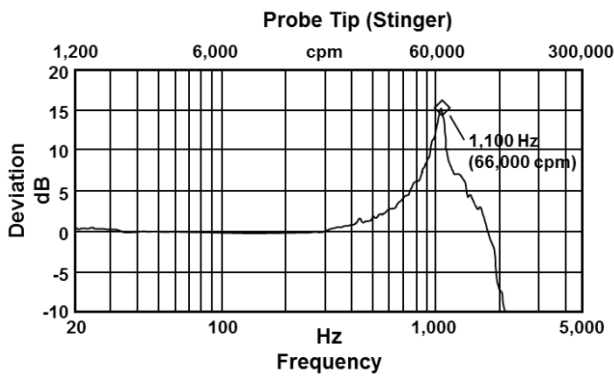
**Frekventni odziv senzora –
Magneti za zakrivljene površine**



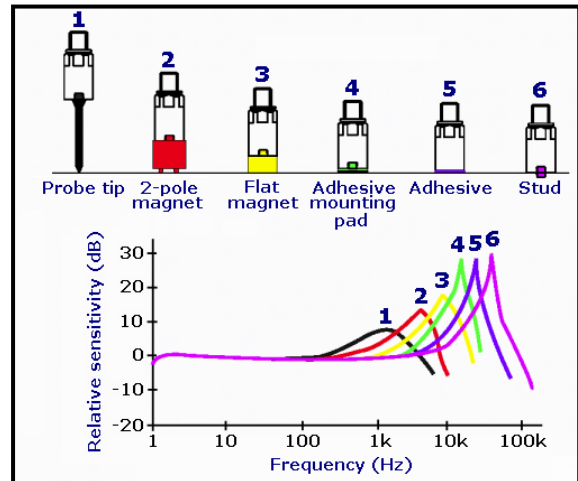
**Frekventni odziv senzora –
Magneti za ravne površine**



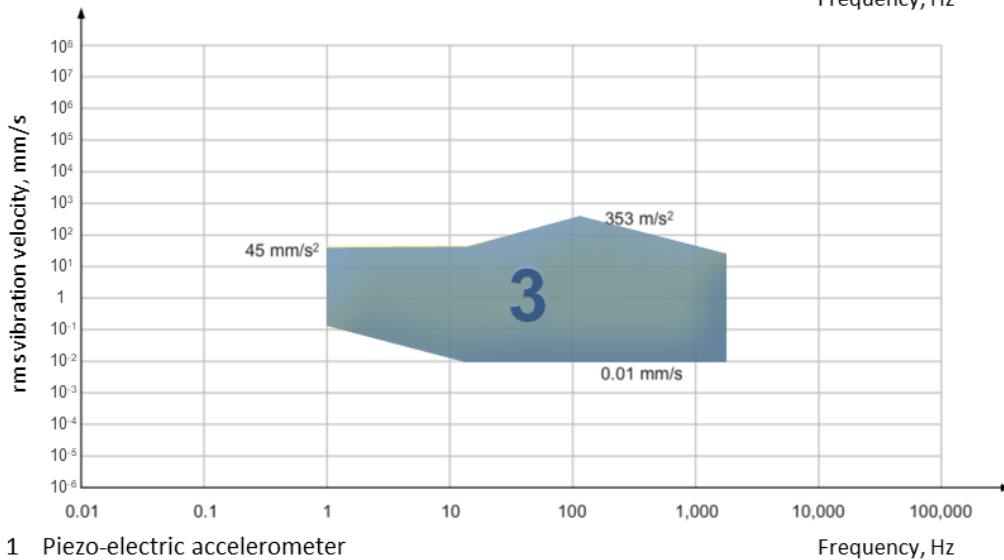
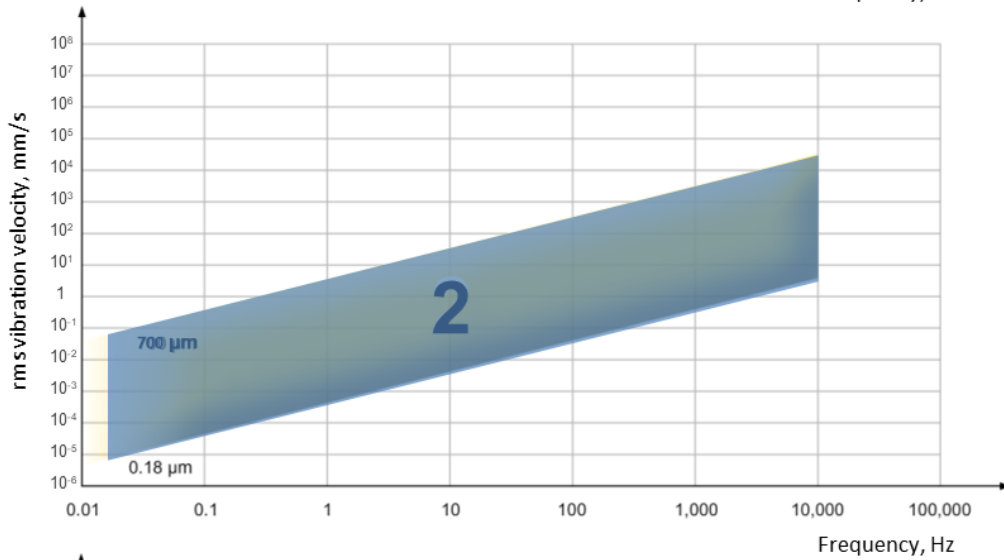
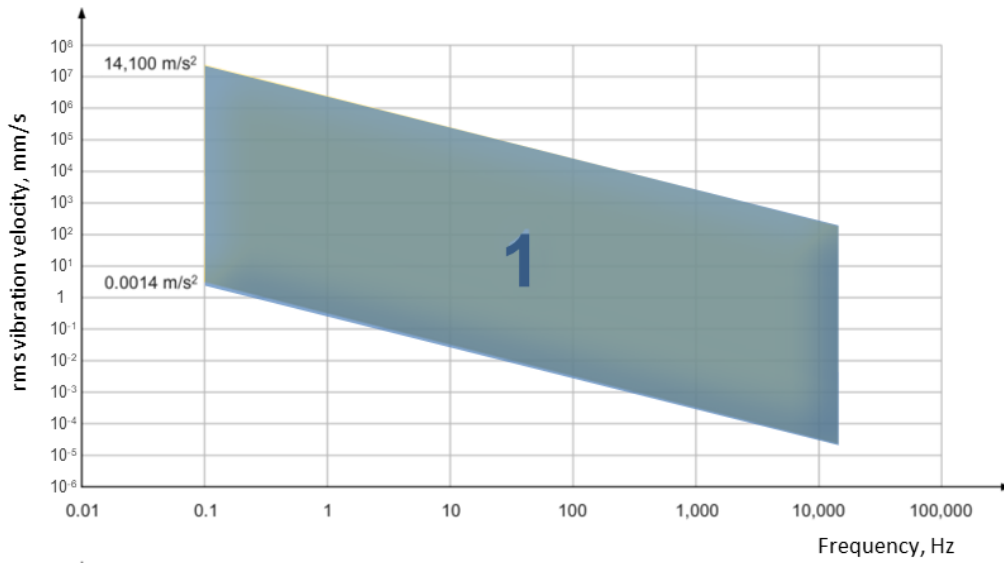
**Frekventni odziv senzora –
"pipalica" (merenje iz ruke)**



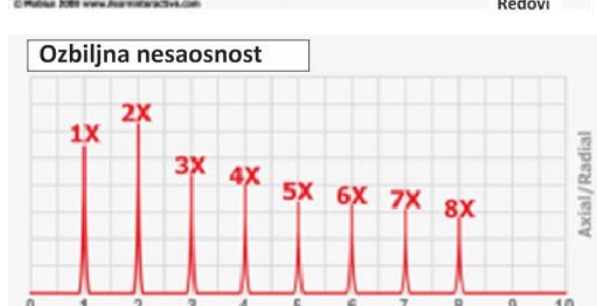
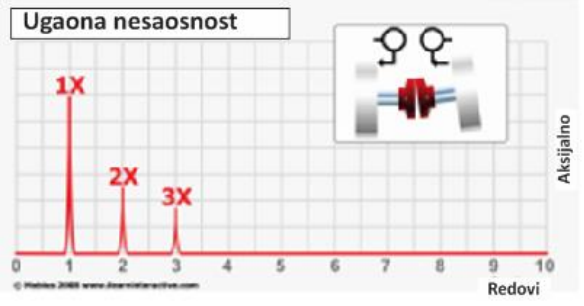
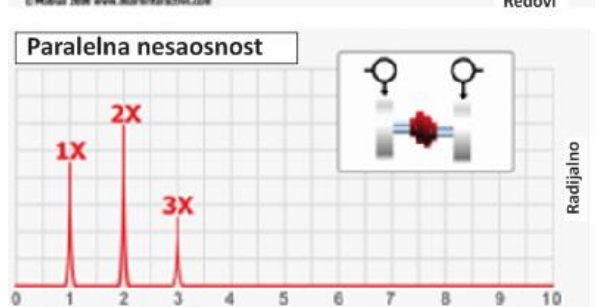
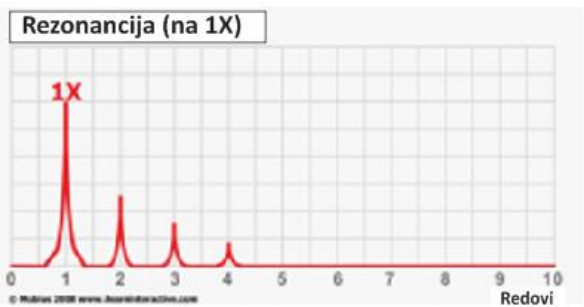
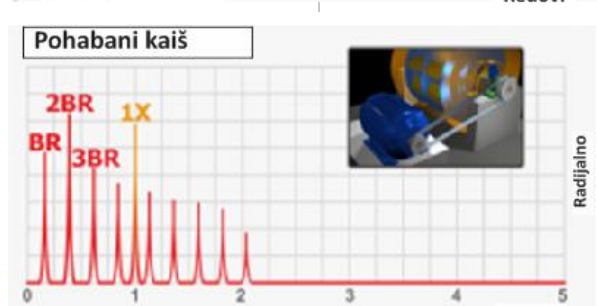
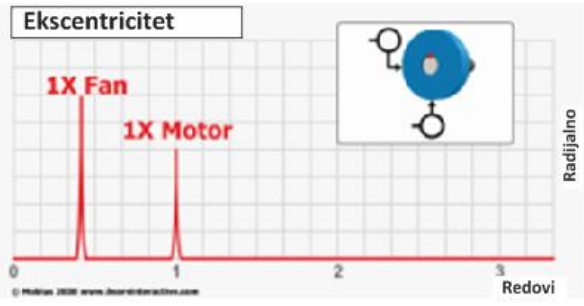
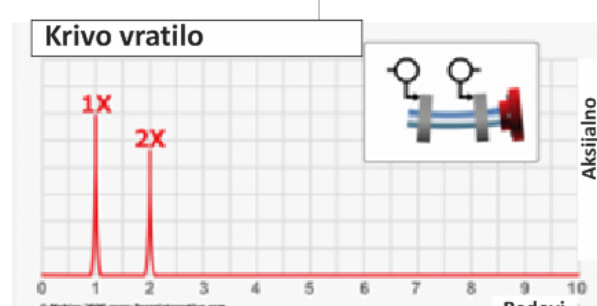
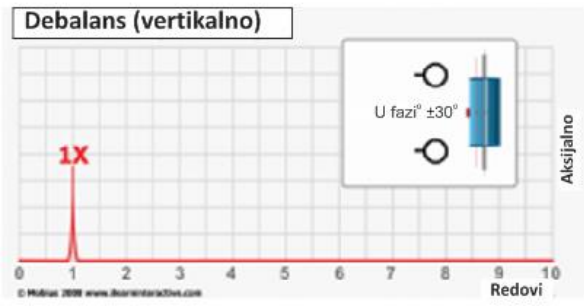
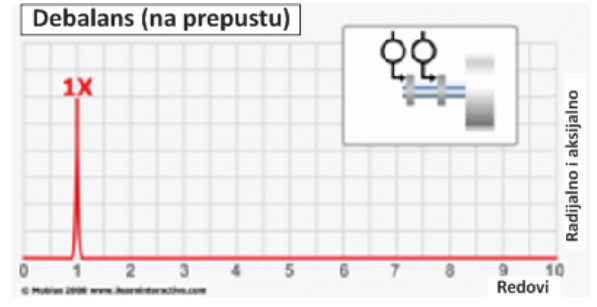
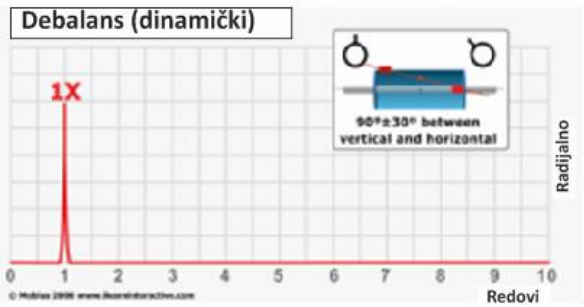
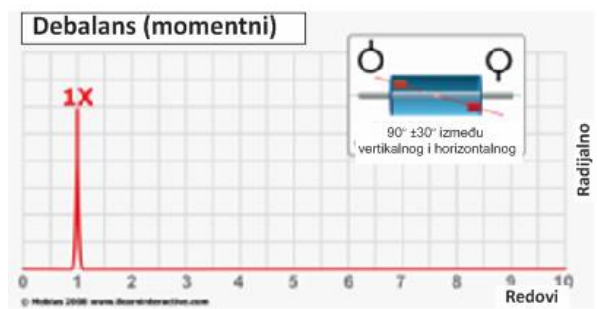
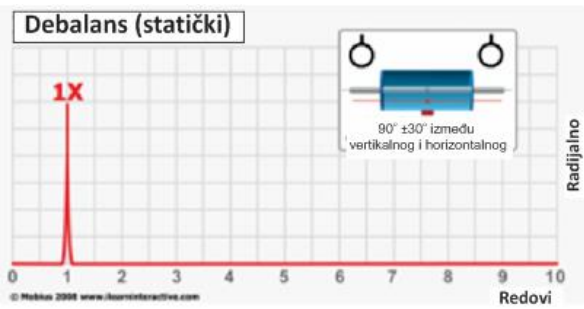
**Krive frekventnih odziva
senzora**

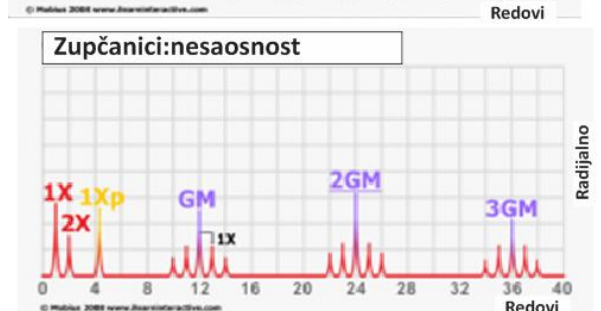
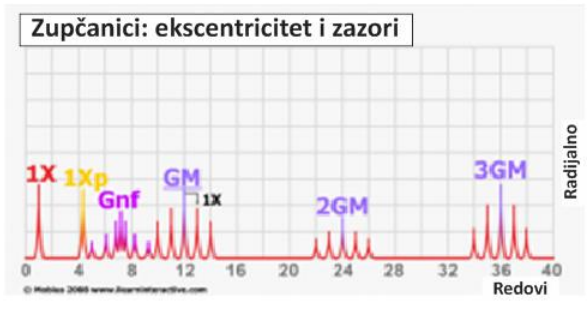
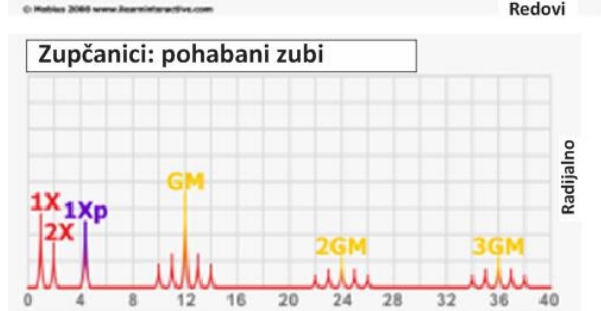
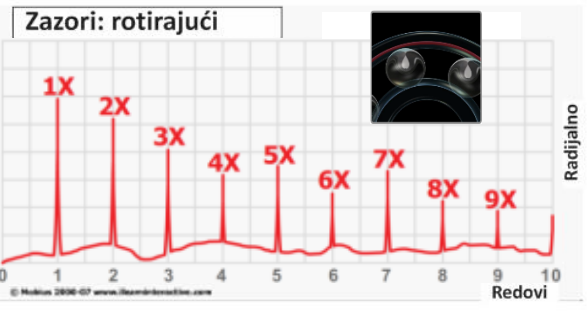
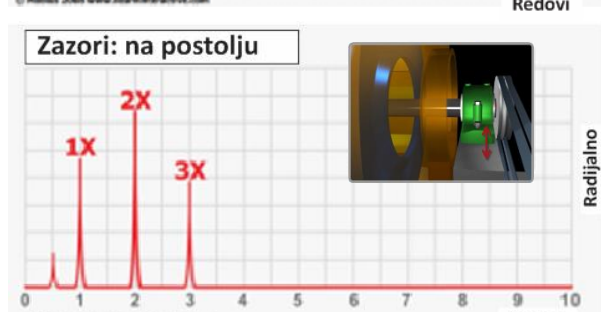
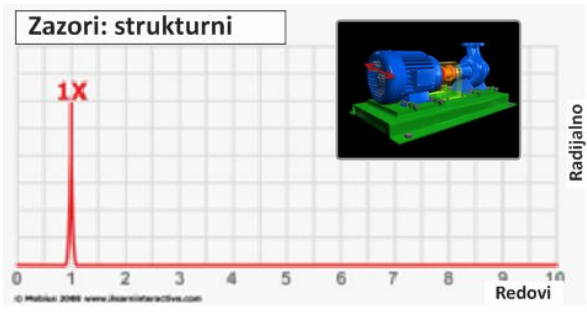
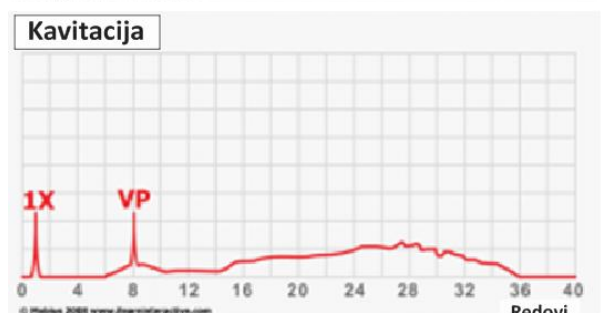
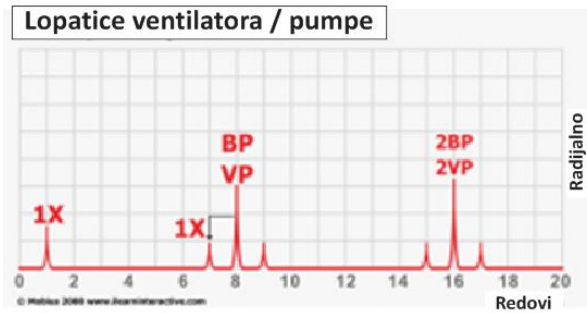
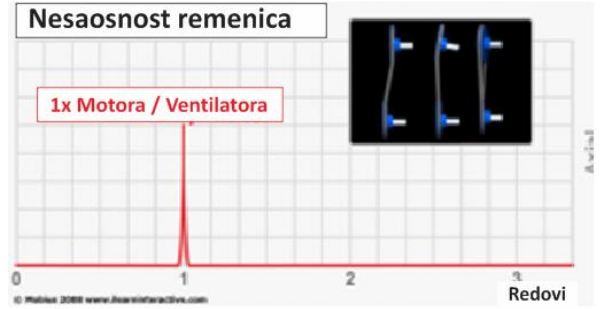
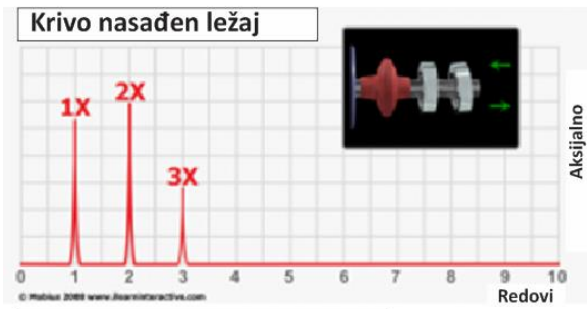


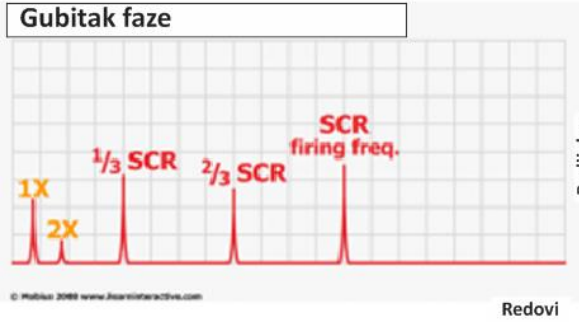
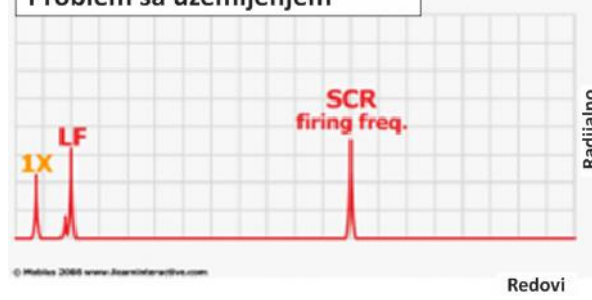
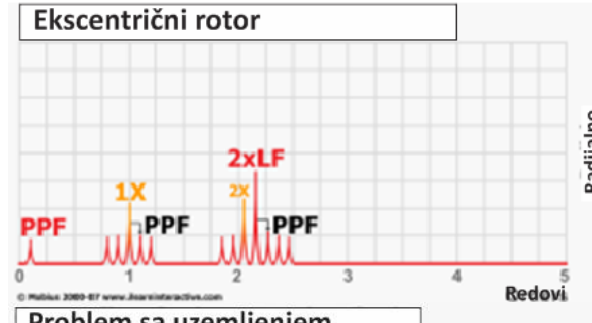
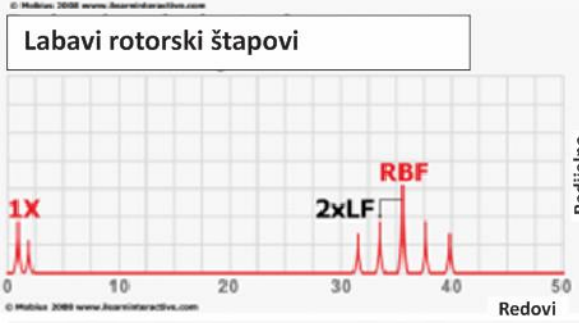
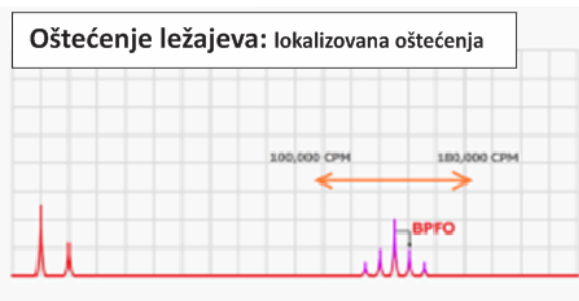
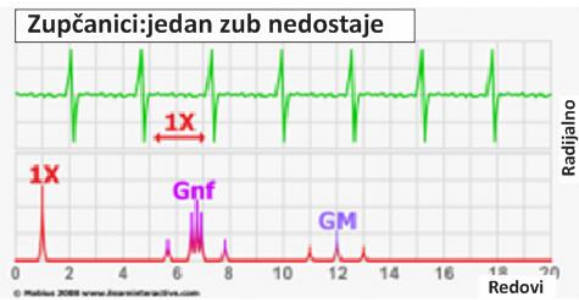
Korisni frekventni opsezi senzora

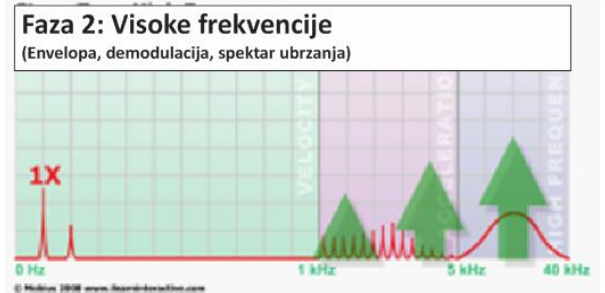
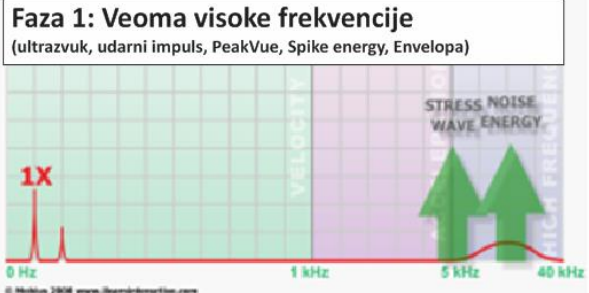
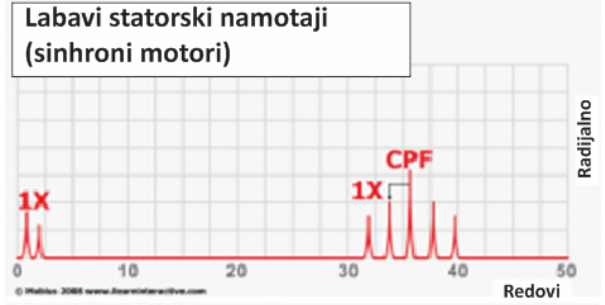
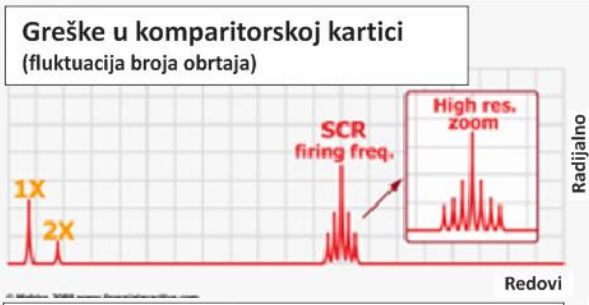


- 1 Piezo-electric accelerometer
- 2 Eddy-current proximity probe
- 3 Electro-mechanical velocity transducer



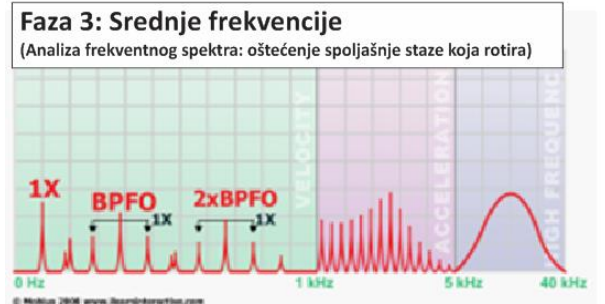
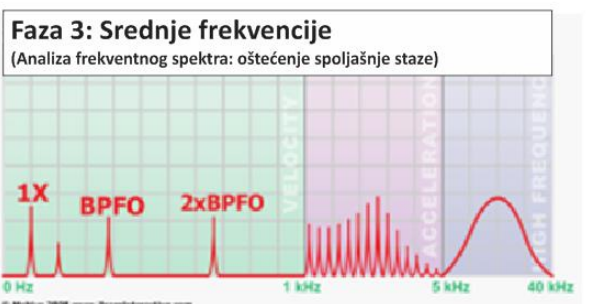






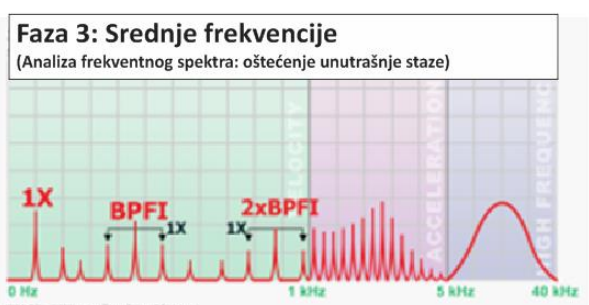
Stage One: Airborne Ultrasound, Shock Pulse, PeakVue, Spike Energy, Envelope

Stage Two: Envelope, Demodulation and Acceleration Spectrum



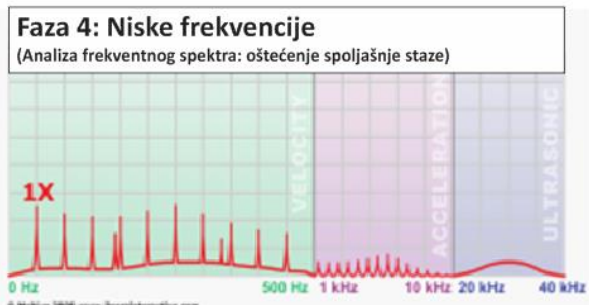
Stage Three: Outer race fault (inner race rotating)

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

Ova stranica je nenamerno ostala prazna