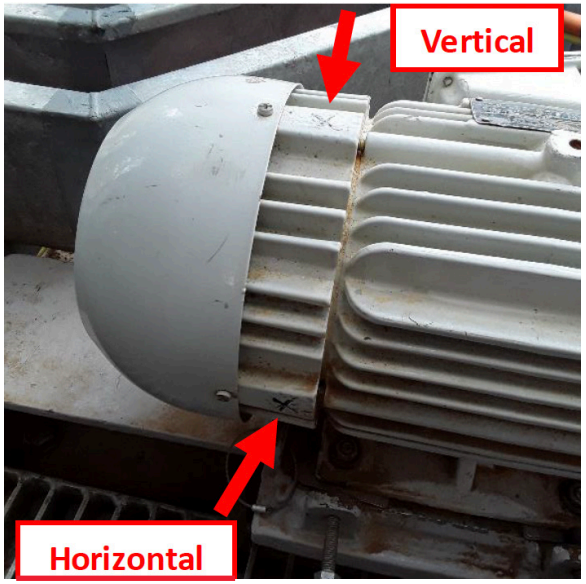
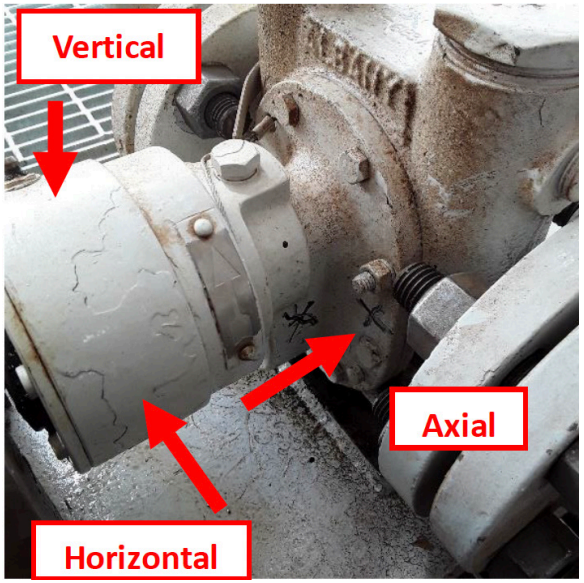
Case Study: Exploring the Impact of Two-Rail Magnets vs. Flat Magnets on Curved Machine Casings





Introduction

On data collection routes, the analyst's choice of magnet plays a pivotal role in obtaining accurate and reliable data. Flat surface magnets have better vibration transfer and are generally preferred when it comes to maximizing the frequency response range of your sensor. Flat surface magnets typically limit the high-end frequency response of a sensor at 600,000 CPM, while curved surface magnets limit the high-end frequency response at about 120,000 CPM. However, the mounting surface needs to be truly flat in order to capitalize on the benefits of flat surface magnets. This case study illustrates a real-world example of the differences in data collection when using a flat magnet and a two-rail magnet on the same curved bearing housing.

Analysis

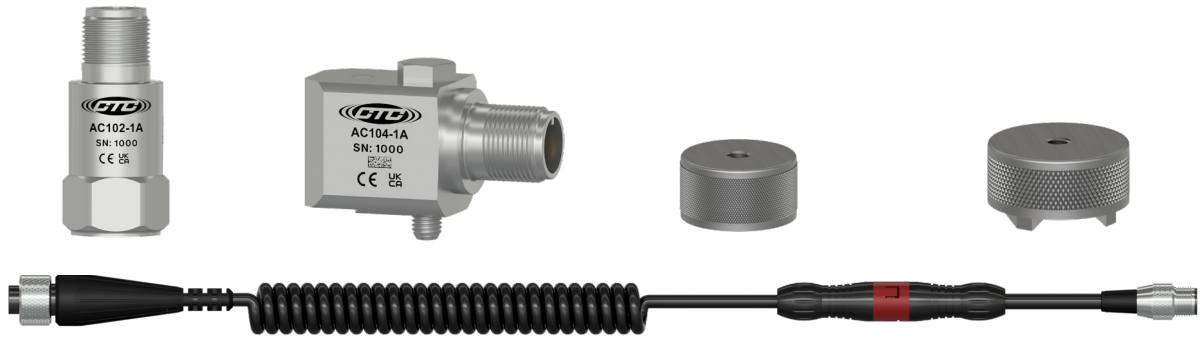
MDI took data from the same bearings using both top and side exit sensors, mounted on flat and curved surface magnets, on the following machines:

- Electric motor - drive end and non-drive end
- Pump - drive end and non-drive end

Products Used

The following CTC products were utilized for this study:

- **AC102-1A** 100 mV/g, standard size top exit accelerometer
- **AC104-1A** 100 mV/g, standard size side exit accelerometer
- **MH123-1A** flat surface magnetic mounting base, 1.25 in. (31.75 mm) OD, 0.68 in. (17.27 mm) height
- **MH114-3A** two-rail magnetic mounting base, 1.40 in. (35.56 mm) OD, 0.75 in. (19.05 mm) height
- **CB104-C555-006-K2C-SF** cable and connector cordset



Case Study: Exploring the Impact of Two-Rail Magnets vs. Flat Magnets on Curved Machine Casings

Findings

- Most of the overall measurement values obtained using the flat surface magnet were consistently higher than those recorded with the two-rail magnet base.
- The measurements done using a flat surface magnet base attenuated some peaks in the medium ~ high frequency range.
- The measurements done using the flat surface magnet base may generate peaks at false frequencies due to the lack of rigidity (rocking motion) of the accelerometer on the machine casing.

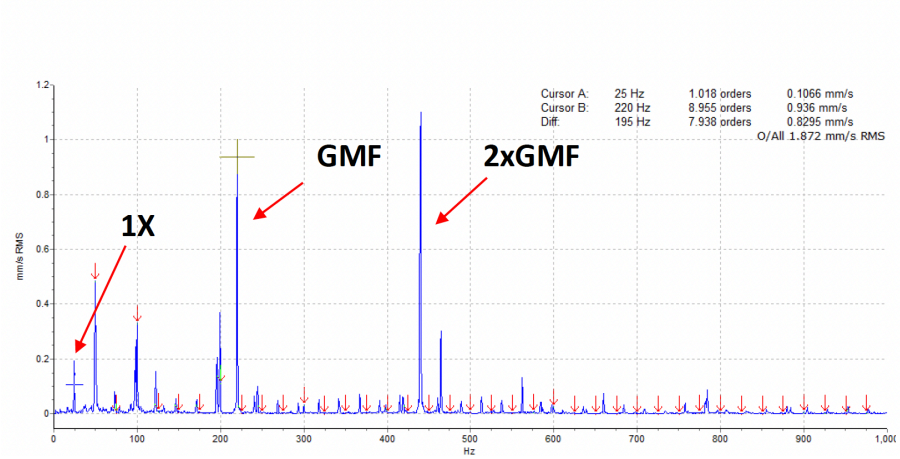
Conclusion

It is incredibly important for vibration analysts to have both flat and two-rail magnet bases in their toolboxes. There are many benefits to flat magnets, but the mounting surface should be carefully evaluated to discern whether or not a flat magnet can be reliably used.

Data Collected by MDI

Two-Rail Magnet Base Sensor

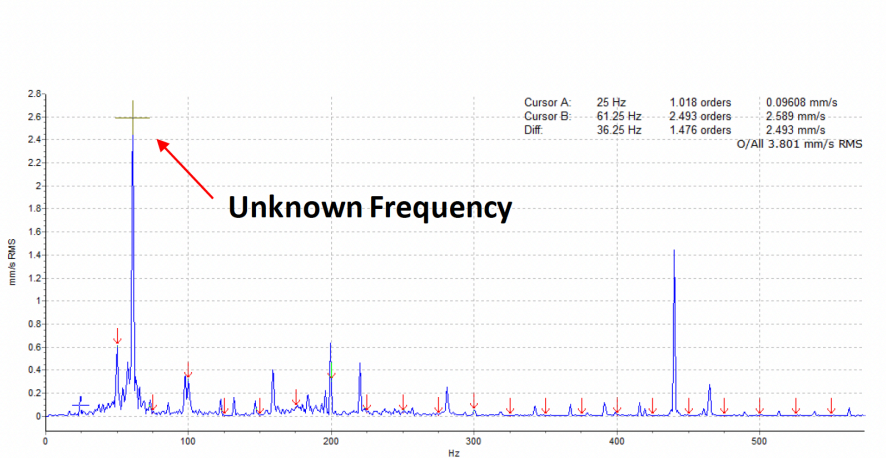
Motor NDE – Horizontal



The spectrum is clearly showing vibration peaks at 1x motor running speed and 9x gear mesh frequency with harmonics.

Flat Magnet Base Sensor

Motor NDE – Horizontal



The spectrum is showing higher vibration levels. The spectrum is showing elevated vibration peaks at (61 Hz) which is not seen at any other measurements. The spectrum is showing an attenuation for the vibration data at medium and high frequencies.