Tip Of The Week

A Leader in Electric Motor Testing

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Frequency Response, Frequency Range, and Frequency Resolution

Technology manufacturers print a lot of things on spec sheets. Some even push the integrity limits of writing specs, which has developed into its own slang term called 'specmanship'. When reviewing specs for technology designed to perform spectral analysis of a current signal, it is important to understand the differences between frequency response, range, and resolution.

- **Frequency response** refers to the accuracy of frequency measurement across a given range. In online motor testing, an example is a frequency response from 10Hz to 20kHz with a tolerance of +/- 3dB. The tolerance (+/- dB) refers to how accurate the measurement is across a given frequency range. The lower the +/-dB number, the higher quality the frequency response and the more accurate the measurement is.

- **Frequency range** refers to the range of frequencies which the equipment is capable of measuring, but without reference to the accuracy or "flatness" of the actual response across the range. For example, the frequency range from 10Hz to 20kHz with a tolerance of +/-10 dB is very poor quality in comparison to the tolerance of +/- 3dB from the previous example.

- **Frequency resolution** describes the resolution of the frequency spectrum delivered by the technology. This is critical because a frequency range of 20kHz sounds impressive, but based on the sampling rate and number of samples it may not be very impressive. A frequency resolution of 1Hz means that every time you move the cursor one increment it jumps 1Hz. This calculates to 20,000 lines of resolution (20,000 Hz / 1 Hz per line = 20,000 Lines). That is insufficient for the analysis of rotor bar integrity using a current spectrum. To properly analyze rotor bar integrity, 0.03 Hz per line of resolution (33 times the 1Hz example) is highly recommended.

You are invited to submit an Electric Motor Testing Tip of your own and receive a free PdMA mug or hat if we publish it! Contact Lou at 813-621-6463 ext. 126 or lou@pdma.com.