



A Leader in Electric Motor Testing

# Tip Of The Week

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April 27, 2020

## Look For The Swirl

For many people the word “swirl” creates visions of whirlpools, storm winds, or even ice cream cones. But if you have been in the reliability industry, and specifically the electrical reliability industry, the word swirl means something totally different. The late G.B. Kliman is credited for much of the research documentation surrounding the swirl effect sometimes referred to as the 5<sup>th</sup> harmonic analysis of AC induction motor rotors. This research showed that the phase shift in the air-gap flux density surrounding a broken bar will result in pole-pass frequency sidebands at the 5<sup>th</sup> harmonic of line frequency. And of equal importance, it showed that these sidebands are less affected by other non-rotor bar related anomalies unlike the case with sidebands around line frequency. As an example, asymmetries like bearing eccentricity or an out of round rotor can mask or give a false indication of a rotor bar issue when looking at the sidebands around line frequency, but again, have little effect on the sideband clarity at the 5<sup>th</sup> harmonic of line frequency. To see a case study discussing the swirl effect visit the PdMA YouTube Channel at:

<https://www.youtube.com/watch?v=P4XIYg-695A&list=PLjgXwy4LaY3rMI2MNKer7SxDA50n9LMSa&index=6>

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