



A Leader in Electric Motor Testing

Tip Of The Week

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Rotor Evaluation Using MCEMAX® - Part 5

Six independent methods of rotor evaluation can be used from the MCEMAX technology to analyze the condition of a squirrel cage AC induction motor: Pole-pass frequency (Fp) sidebands around line frequency, 5th harmonic, demodulated Fp frequency, Rotor Influence Check (RIC), In/Rush-Start/Up, and average inductance. Over the next six tips we will discuss each of these methods in detail and provide examples.

Part 5 - 5th Harmonic

Broken rotor bars in a squirrel cage induction motor result in a 180° phase shift in the rotor magnetic flux, sometimes called the “swirl effect”. This can be seen as three peaks separated by Fp to the left of the 5th harmonic. Performing an FFT of the stator current provides a spectrum plot in the frequency domain, which allows isolation of these peaks at the 5th harmonic. For a 60Hz distribution system the 5th harmonic would be 300Hz. For a 50Hz distribution system the 5th harmonic would be 250Hz. The presence of these fault peaks to the left of the 5th harmonic is an excellent correlative tool in confirming rotor defects. The lack of these peaks to the left of the 5th harmonic is a strong indication of no rotor bar defects, even when other indications such as Fp sideband around line frequency exist. Always correlate with the 5th harmonic before making a rotor defect call.

To see an example of the swirl effect used to confirm a rotor bar defect, visit the PdMA YouTube channel at:
<https://www.youtube.com/watch?v=Q-AZ8ZT7myk>

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. 166 or lou@pdma.com.

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