



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, 5<sup>th</sup> 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 - 5<sup>th</sup> 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 5<sup>th</sup> harmonic. Performing an FFT of the stator current provides a spectrum plot in the frequency domain, which allows isolation of these peaks at the 5<sup>th</sup> harmonic. For a 60Hz distribution system the 5<sup>th</sup> harmonic would be 300Hz. For a 50Hz distribution system the 5<sup>th</sup> harmonic would be 250Hz. The presence of these fault peaks to the left of the 5<sup>th</sup> harmonic is an excellent correlative tool in confirming rotor defects. The lack of these peaks to the left of the 5<sup>th</sup> 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 5<sup>th</sup> 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>

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