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Tip Of The Week

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Apparent Broken Rotor Bars?

When testing for broken rotor bars, the Rotor Evaluation test (Pole Pass Sidebands and Swirl Effect), Oscillations in Steady State Inrush current envelope, RIC test, and the common “surging sound” are commonly used. Although not very common, there is one situation that may deceive you in your analysis. A situation that may appear to be broken rotor bars may be as a result of the rotor being constructed using a “pseudo-spider” design. This design has vents punched out in the center of the rotor. When the number of vents equals the number of poles of the machine, the steel legs of the rotor’s pseudo-spider modulate the line current at the pole-pass frequency and multiples thereof. These modulations appear as pole-pass sidebands, swirl effect, and steady state current oscillations, which gives the appearance of broken rotors. It is important to note that this is not a detrimental situation like that of broken rotor bars, thus, it is important to distinguish the difference between the two.

How can you differentiate these pseudo-spider modulations from that of broken rotor bars? This is a very difficult situation, but, the primary difference may typically be in how sinusoidal the steady state current oscillations are. In the data that we have seen, the oscillations created by a pseudo-spider tend not to be sinusoidal and tend to have one large lump, and then a smaller lump when viewed in the enveloped current analysis. Broken rotor bars tend to form a more pure sinusoid. Additionally, when the rotor is constructed using a pseudo-spider, it won’t tend to have the surging sound, or the sound may be quite diminished compared to broken rotor bars.

So if you experience this situation in the field, take a very close look at how sinusoidal the steady state enveloped current appears. If it’s not sinusoidal, check with the manufacturer regarding the rotor construction.

Source: *Induction Motor Case Histories: A Focus on Electrically Related Phenomena*, Presented by Bryan Evans - TECO-Westinghouse at the 2009 Vibration Institute Conference

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.