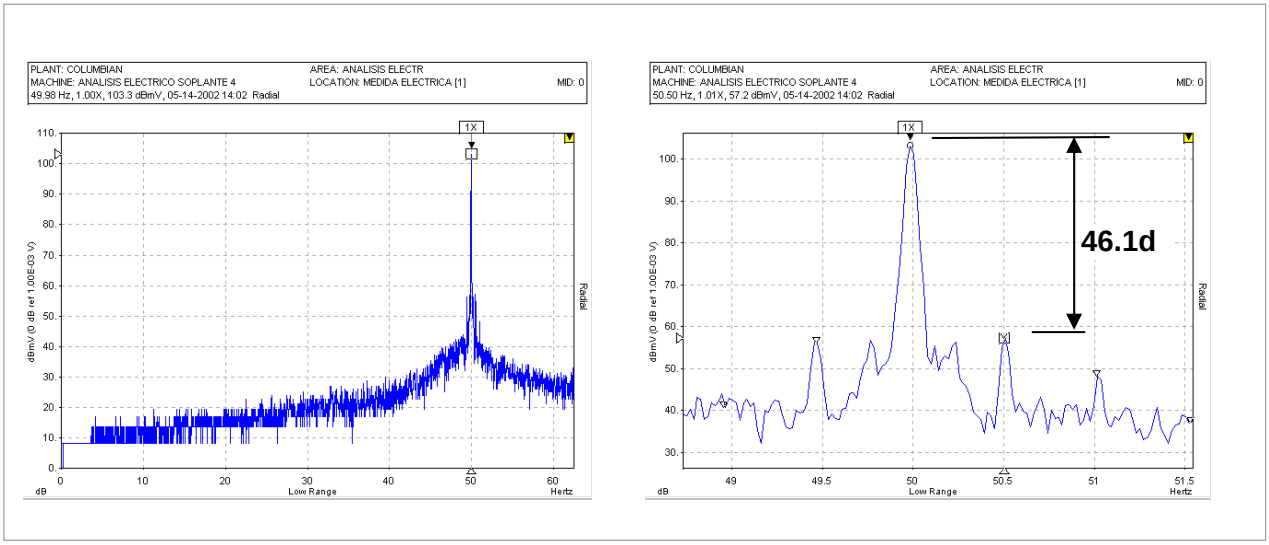
APPLICATION NOTE

Motor Current Signature Analysis

Defective Rotor Bar Problem



Modulation of the electrical line current occurs in an AC induction motor with a defective rotor bar. In a spectrum of motor current, this modulation creates pole pass sidebands around the line frequency peak (60 Hz in North America). The sideband spacing is equivalent to the slip frequency multiplied by the number of poles. As an example: In the USA a two pole motor operating at 3570 rpm has a pole pass frequency of 60 rpm (1 Hz). Therefore, we might expect to see a large peak at 60 Hz and sidebands at 59 and 61 Hz if the motor had a defective rotor bar. Outside of North America, the electrical line frequency is 50 Hz. An example of a motor in Europe follows.

Motor current signature was performed in Europe on a very large two pole induction motor operating at 2985 rpm. See the spectral data below. The 50 Hz line frequency peak is clearly seen in the spectrum on the left. In the zoomed spectrum on the right note the pole pass sidebands (30 rpm spacing) around the line frequency peak.

It is generally accepted that if the sidebands are more than 55 to 60 dB down from the 50 Hz peak, the rotor bars are considered good. If the sidebands rise to within 45 to 50 dB of the 50 Hz peak, damaged rotor bars are likely. When the delta is less than 40 dB, a cracked rotor bar is highly likely. It is important to state that these rules only apply for data taken from a motor that is loaded to at least 75% of its rated load. Additionally these rules apply regardless of whether line frequency is 50 or 60 Hz.

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