# Identifying the Motor Rotor Bar Related Peaks in a Spectrum

By Alan Friedman, DLI Engineering Corp

       The motor bar peak in a spectrum appears at a frequency equal to the number of motor bars multiplied by the shaft rate of the machine. Although initially, most analysts will have no idea how many motor bars there are, identifying the peak that relates to the motor bars is fairly simple to accomplish. The reason for this is that the motor bar peak will have peaks on either side of it, spaced 120 Hz away (100 Hz where electrical line frequency is 50Hz). These peaks are termed "sidebands" and they are caused by the modulation of the motor rotor by the electromagnetic forces that cause the motor to spin.

       Typically there will be between 30 and 90 motor bars, so, be sure that the data being collected is about 100 orders of run speed. The amplitudes of these peaks may be quite low compared to other machine vibration. For this reason it is useful to use a LOG amplitude scale such as VdB, in/s log or mm/s log. Most analysis software packages have a sideband cursor or a reference cursor that will make it easy to calculate the frequency difference between two peaks. We are looking for a tallish peak with two smaller peaks on either side of it, spaced 120 Hz from it. Typically the taller peak will be the motor bar peak. The motor bar peak should also be an integer multiple of the machine run speed although it may not appear to be an exact multiple due to frequency resolution errors. Once the peak has been identified, it should be labeled so it can later be trended.
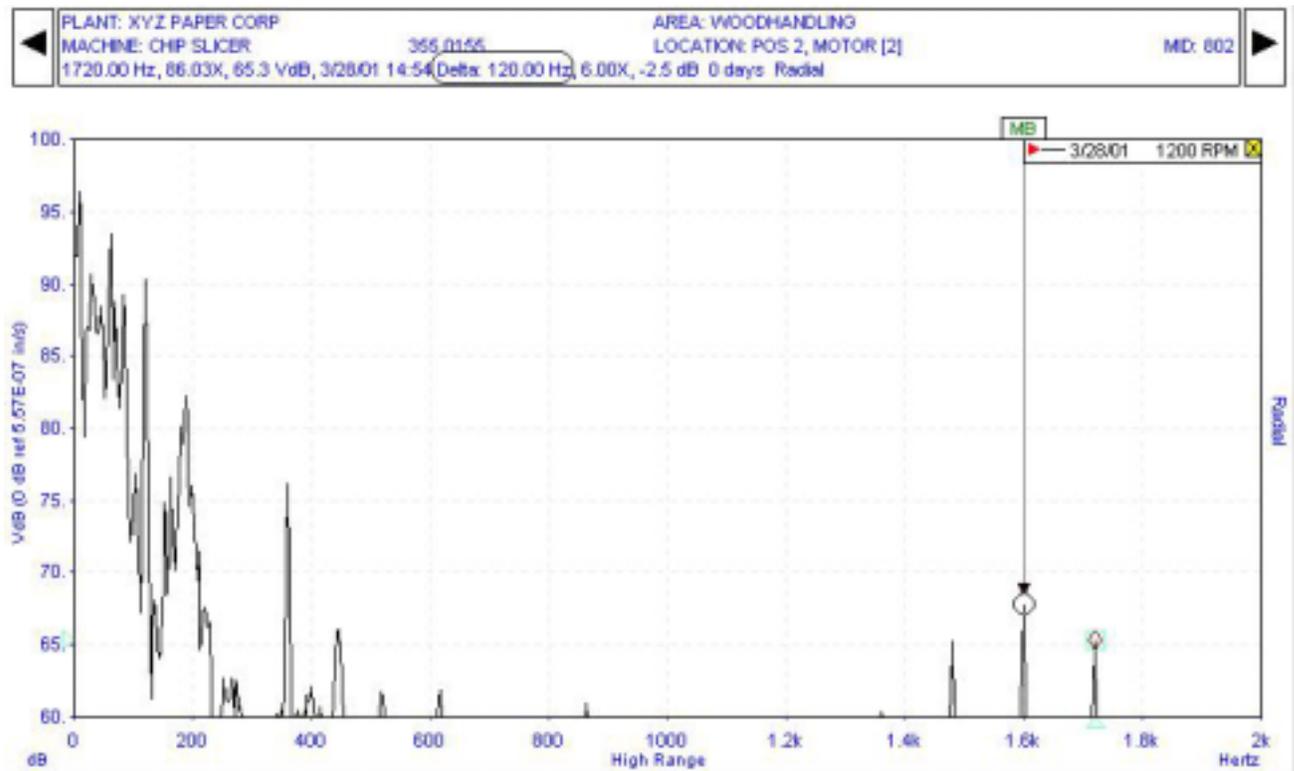
       We can see if the figure above a peak labeled "MB" with peaks spaced 120 Hz apart on either side of it. This is the motor bar pass rate and its sidebands. You may also see a harmonic or multiple of this peak also with 120 Hz sidebands around it. If the motor has a cracked or damaged bar, these peaks will go up in amplitude.