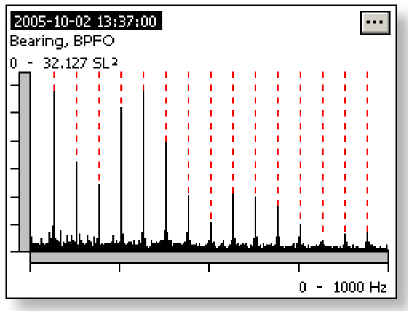
Leonova™ Infinity – SPM Spectrum



Pattern recognition:
Bearing with rotating inner race and a damaged outer race. BPFO = ball pass frequency outer race and its multiples dominate the shock pulse spectrum.

The purpose of 'SPM Spectrum' is to verify the source of high shock pulse readings. Shocks generated by damaged bearings will typically have an occurrence pattern matching the ball pass frequency over the rotating race. Shocks from e. g. damaged gears have different patterns, while random shocks from disturbance sources have none.

Signal and measurement

The resonance frequency of the SPM shock pulse transducer, calibrated to 32 kHz, constitutes the ideal carrier wave for transients caused by shocks. The output of this transducer is the same type of demodulated signal produced by 'enveloping', with this important difference: both frequency and amplitude response of the SPM transducer are precisely tuned, so there is no need to find uncertain and shifting machine resonances to get a signal.

Leonova first measures the shock amplitude by a shock pulse measurement with the dBm/dBc or the LR/HR method. The results are the bearing condition data, evaluated green - yellow - red.

The second measurement produces a time record that is subjected to a Fast Fourier Transform (FFT). The resulting spectrum is used mostly for pattern recognition. Spectrum line amplitudes are influenced by too many factors to be reliable condition indicators, so all condition evaluation is based on the dBm or the HR values.

One unit for amplitude in an SPM spectrum is S_D (Shock Distribution unit), where each spectrum is scaled so that the total RMS value of all spectrum lines = 100 S_D = the RMS value of the time record. The alternative is S_L (Shock Level unit), the RMS value of the frequency component in decibel. Alarm levels are manually set for each symptom to show evaluated results in green - yellow - red. Various types of spectra can be produced. The recommended setting is a spectrum with a resolution of at least 0.25 Hz, e. g. 3200 lines over 500 Hz, saving peaks only.

Input data

Pattern recognition demands precise data on the bearing and exact measurement of the rpm. The rpm should be measured, not preset. The factors defining the bearing frequencies are obtained from the bearing catalogue in Condmaster by stating the ISO bearing number.

Evaluation

The frequency patterns of bearings are preset in Condmaster. Linking the symptom group 'Bearing' to the measuring point allows the user to highlight a bearing pattern by clicking on its name. Other symptoms can be added when appropriate, e. g. for gear mesh patterns. Finding a clear match of a bearing symptom in the spectrum is proof that the measured signal originates from the bearing.

Technical data

Frequency range:	0 to 100, 200, 500, 1000, 2000, 5000, 10 000, 20 000 Hz
Number of spectrum lines:	400, 800, 1600, 3200, 6400
Measurement windows:	Rectangle, Hanning, Hamming, Flat Top
Spectrum types displayed:	linear, power
Averages:	time synchronous, FFT linear, FFT peak-hold
Frequency units:	Hz, CPM
Saving options for spectrum:	full spectrum, peaks only
Amplitude scale unit:	S_D (Shock Distribution), S_L (Shock Level)
Scaling:	linear or logarithmic X and Y axis
Zoom:	true FFT zoom, visual zoom
Pattern recognition:	Bearing frequencies and optional patterns highlighted in the spectrum. Automatic configuration of bearing symptoms linked to ISO bearing no.
Transducer type:	Shock pulse transducers with probe and quick connector, SPM 40000/42000

As an option, the frequency range can be extended to 40000 Hz, the number of spectrum lines to 12800.

Ordering numbers

LEO132	SPM Spectrum, unlimited use
LEO232	SPM Spectrum, limited use
LEO139	12 800 lines, 40 kHz, option

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