APPLICATION NOTE

NEW TECHNOLOGY: Azima DLI Baseline Synthesizer

Available in ExpertALERT 3.20 and ALERT Online 2.2

Background

Establishing what is considered "normal" operating vibration signatures for machinery has been historically accomplished by selecting candidate machinery vibration tests from identical machines without mechanical faults, normalizing for speed variations, and numerically averaging them together to obtain an "average" vibration signature. Given this average signature, the Azima DLI automated diagnostic "expert" system compares newly acquired data from machines of unknown state to the statistical "average" signature data and determines current machinery condition through analysis of patterns of exceedances over the average. This methodology is feasible and useful when a large number of historical sets of vibration tests for groups of machines are available, but is not feasible when there is a lack of such abundant test data from a variety of machines in various conditions. Furthermore, building average baselines requires sufficient knowledge and experience in machinery vibration signature analysis. The new baseline synthesizer tool described herein is a solution to this issue allowing the synthesis of average baselines for use when tests If similar machines without faults are not available.

Introducing the Baseline Synthesizer

The baseline synthesizer is an algorithm that uses machinery technical descriptions to intelligently compute a set of baseline vibration spectra, mimicking what a vibration test on an ideal fault-free machine of that type would produce. The baseline vibration data synthesizer models the effect of vibration generated from background, internal machinery components and vibration excited by nearby connected components. It generates signatures for all bearing locations in three axes and 2 frequency ranges for a complete reference.

Inputs are listed as follows:

- Vibration test locations
- Machinery speed
- Arrangement of machinery component types such as electric motors, centrifugal pumps, couplings, fans, belt drives, gear trains, compressors, etc.
- Transmission type such as belts drive, gear drive or both
- Transmission ratio
- Existence of Couplings

Outputs

2 spectra (low range and high range) for 3 axes at each test location.

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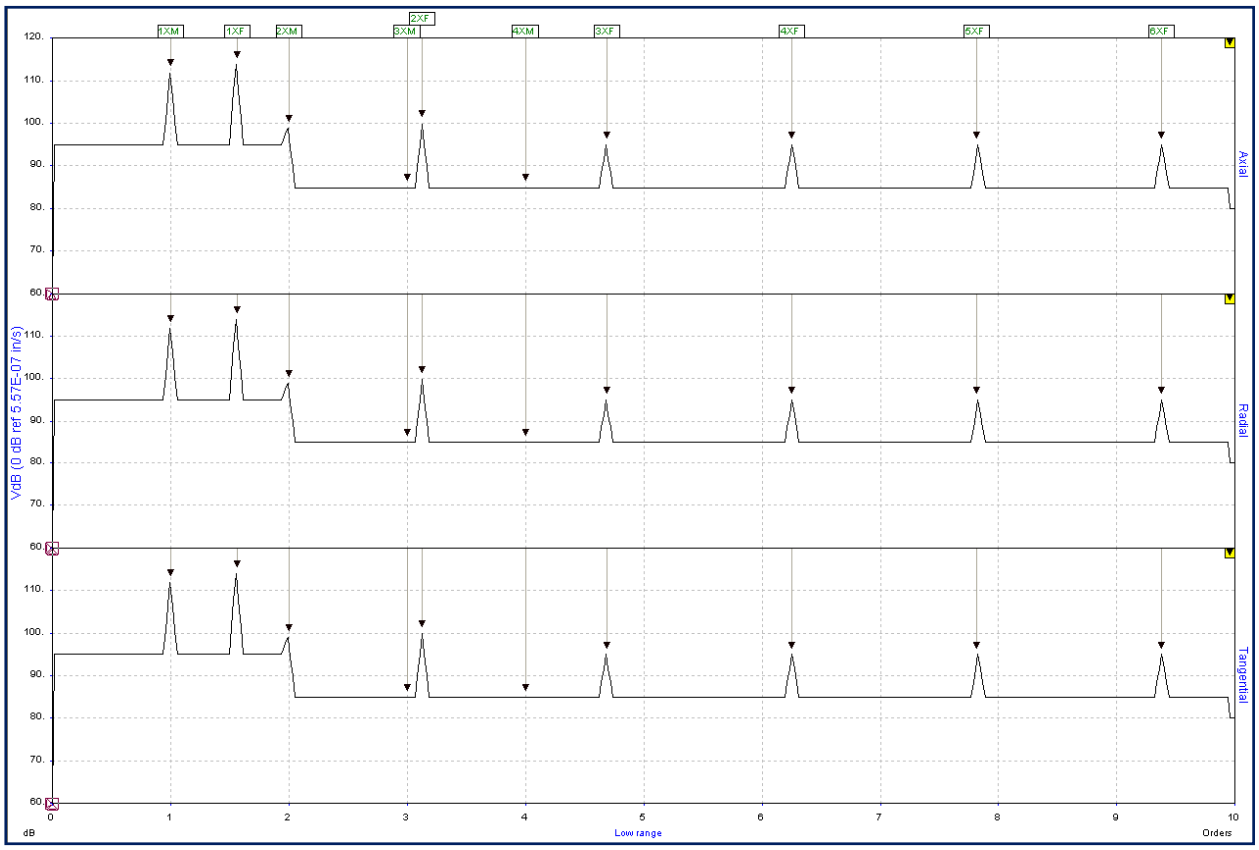
Sample: Motor driving a fan via a belt

Inputs:

- Motor speed: 1780
- Belt ratio 1.563:1 (increase)
- Intended Test locations: Motor Free End (2), Fan Free End (3), Fan Drive End (4)

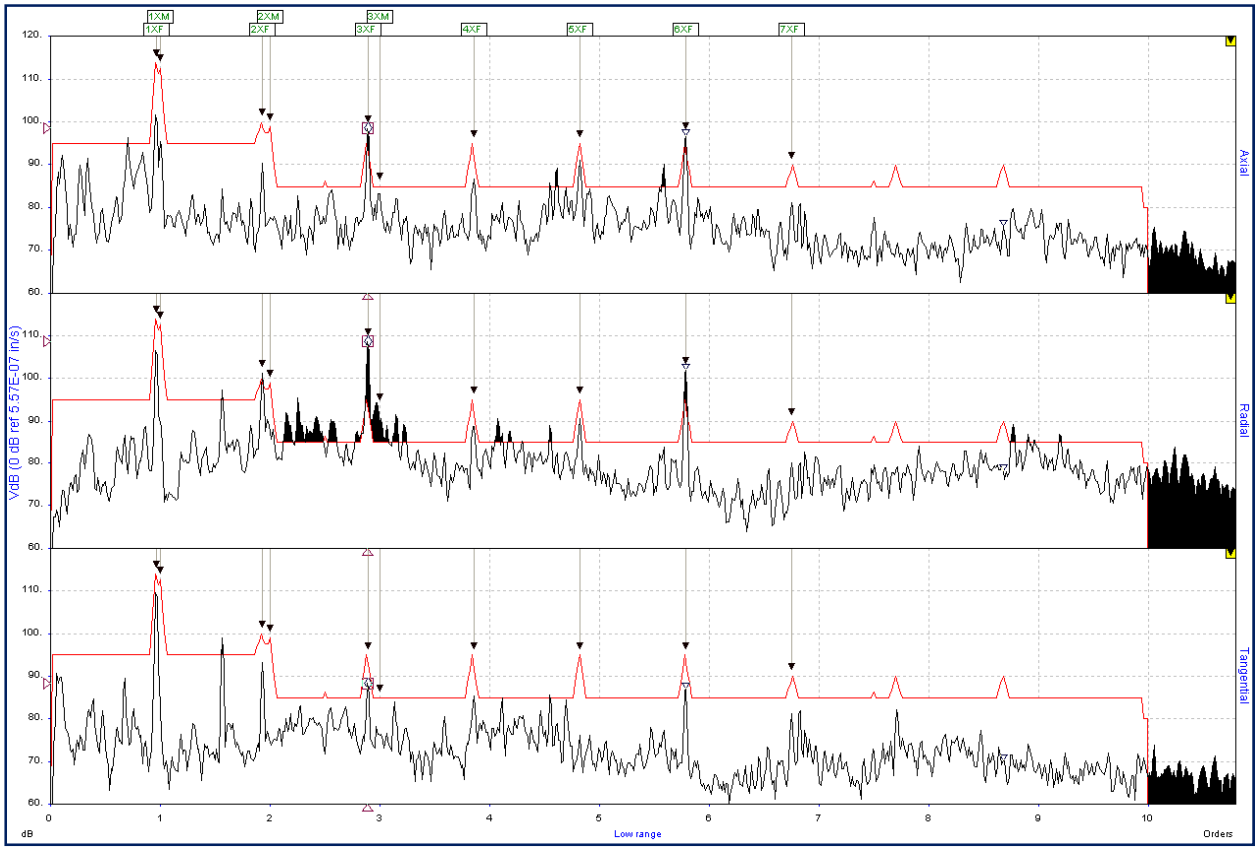
Output:

Synthetic Baseline Result (position 2 low frequency range):



The baseline synthesizer requires only a minor amount of information from the user to accurately derive values for all amplitudes in 6 spectra per test location. This enables comparison of newly acquired data to the baseline for diagnostic purposes.

Actual test data overlaid on the synthetic baseline showing regions of exceedence:



This new technology removes the need for vibration testers to have pre-knowledge of data analysis to get effective results and automated diagnostics from ExpertALERT™ and ALERT Online™.

Patent pending, May 2008.