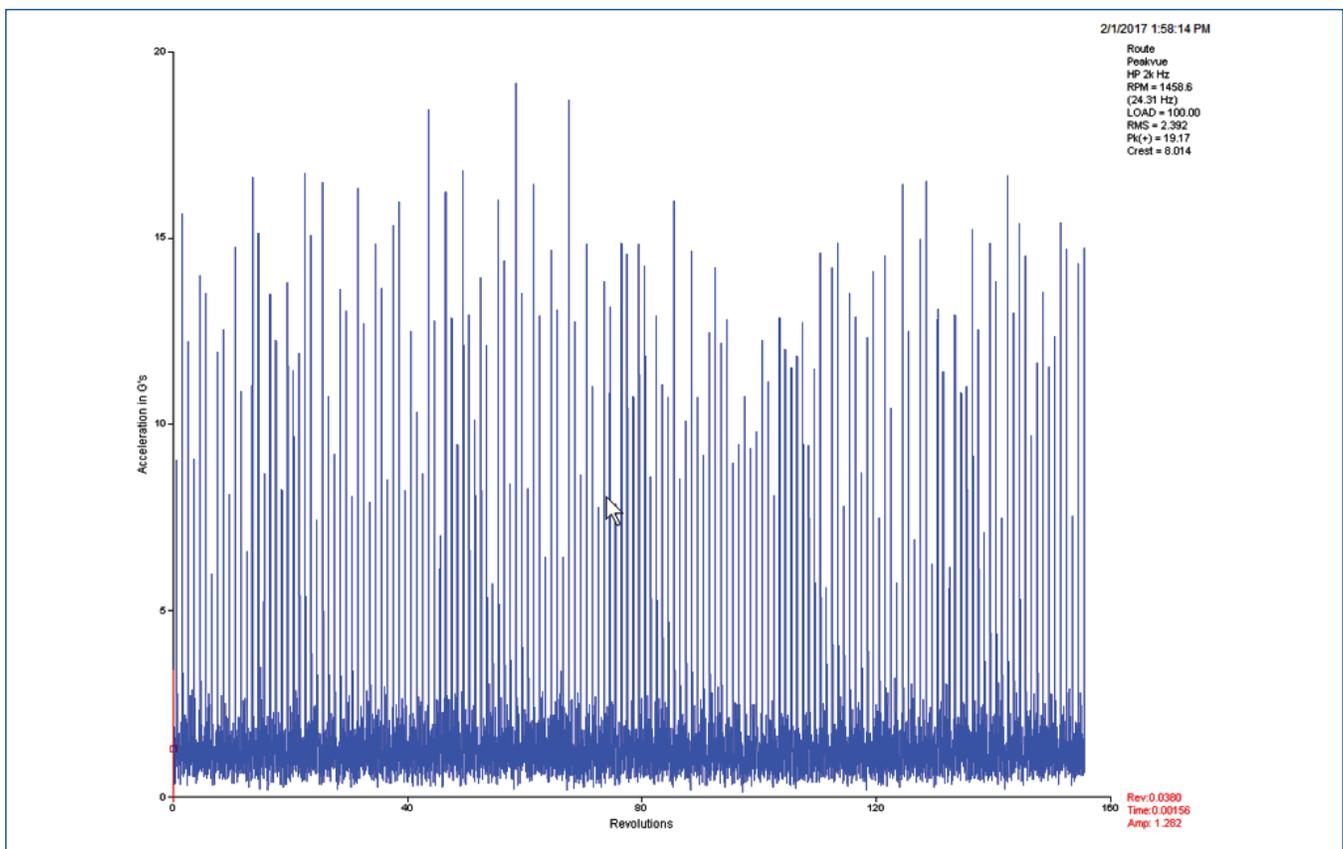


Confirming Gearbox Defect Using Waveform & PeakVue Technology

A conventional time waveform is a time versus amplitude display of a digitized, low-pass filtered vibration signal. Low-pass filtering is used because an Fmax was set, or maximum number of events (frequencies) of interest. The Fast Fourier Transform (FFT) process that generates a spectrum is designed to work well on repetitive (periodic) signals. But what if the machine's vibration signal (the original digital waveform) has modulation, distortion or impacting? Due to the FFT process mathematics, the spectral amplitudes may not reflect the true severity of the machine's condition. Learning to interpret vibration in the time domain can be a valuable additional analysis tool beyond normal spectral analysis.

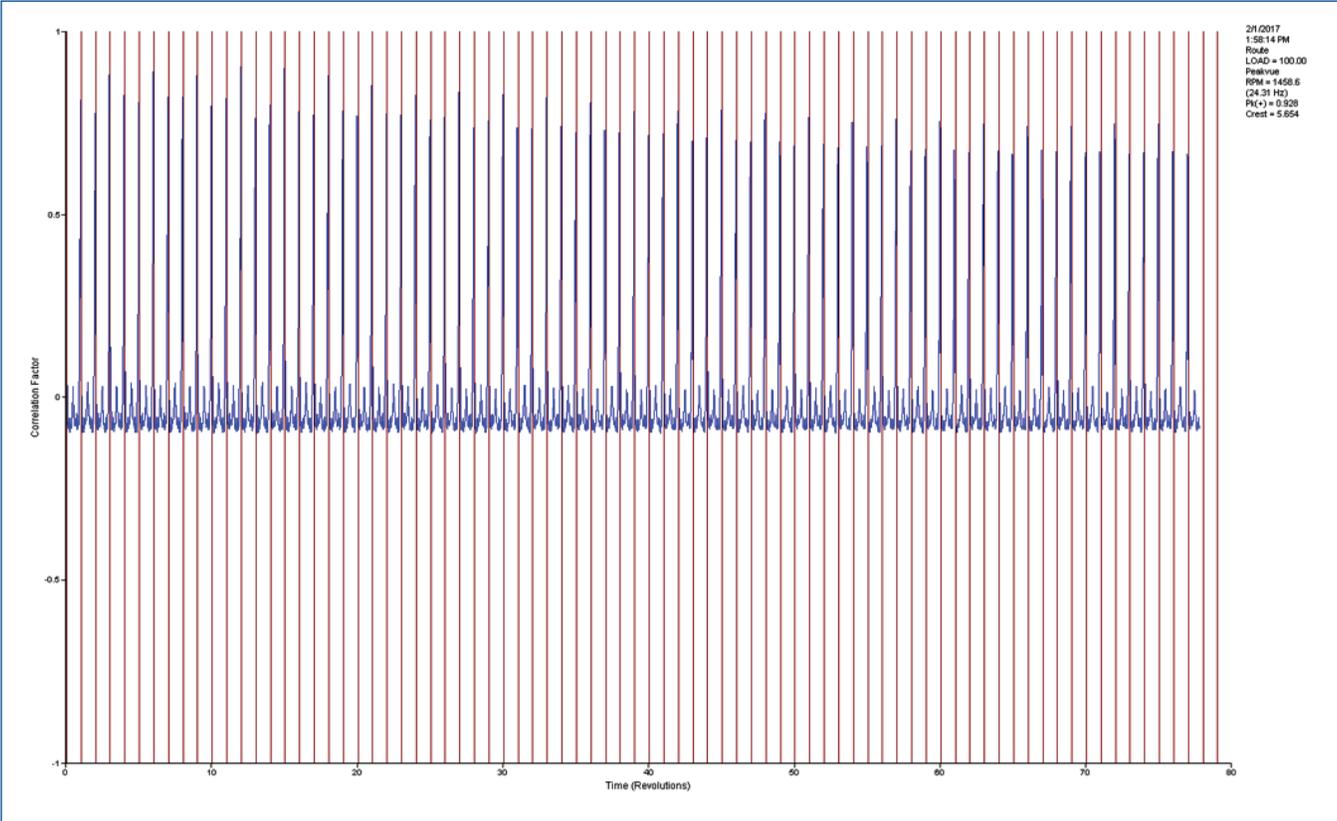
Review the case history below using PeakVue, waveform autocorrelation and the autocorrelated circular waveform plot to confirm gearbox defect.

Data collected on a gearbox indicates an abnormal gear issue. The conventional vibration waveform had indicated only slightly higher levels of impacting at once per revolution, however, a peak of over 19 G's is present in this PeakVue waveform.

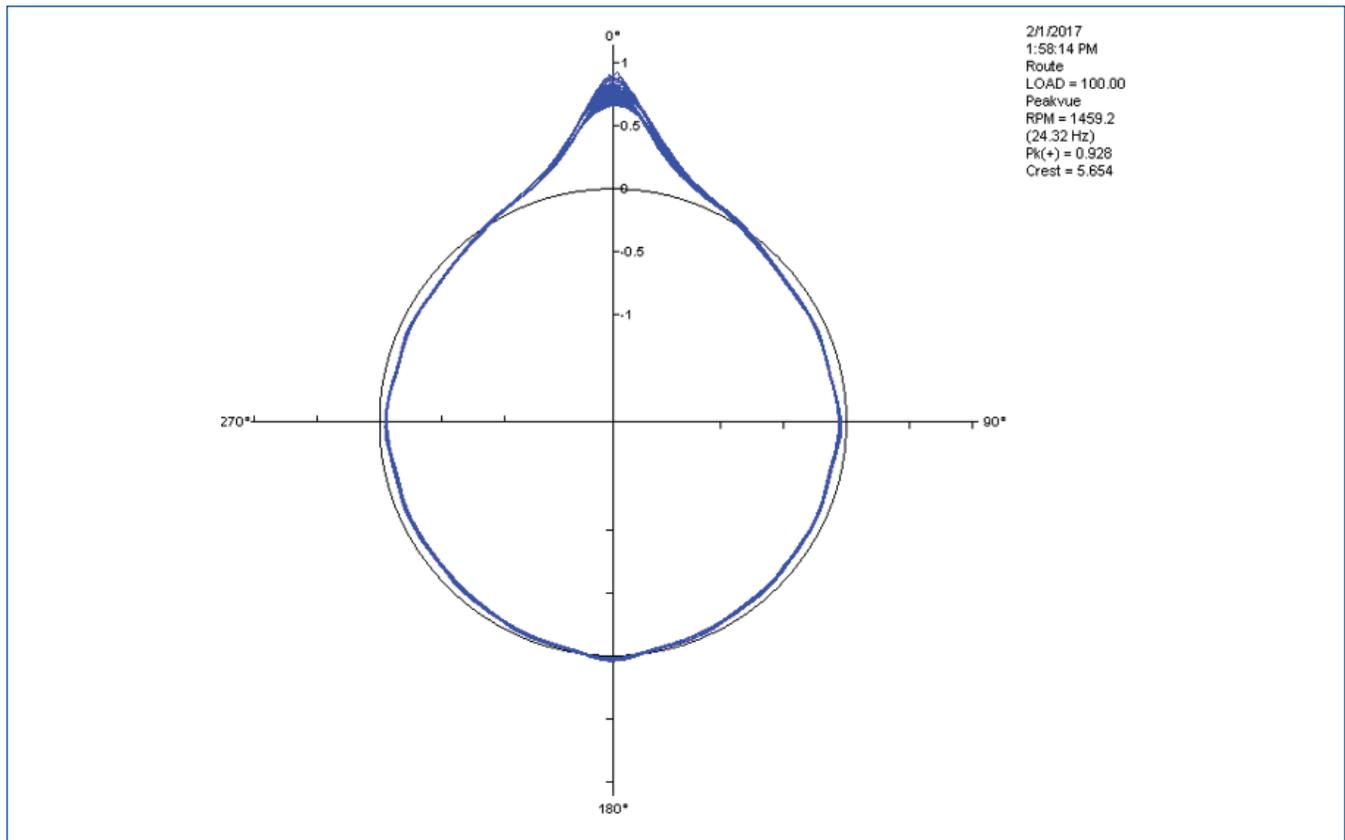


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The autocorrelated waveform indicates a significant impact event once per revolution. This pattern is usually indicative of a broken or missing tooth on the gear.



The circular format shows further evidence of a once-per-revolution event, further confirmation of a broken tooth. The 1 X TS event offsets the circular autocorrelation waveform at a probability of one (or close to one) at the Top Dead Center (TDC) of the circular plot. This position is due to the revolution marker coinciding with the 1 X TS peak in the autocorrelated PeakVue waveform as shown above.



After disassembly and inspection, a single broken gear tooth was confirmed. The Time Waveform Analysis course uses these and other tools, such as waveform analysis parameters and alarms, to enhance and accelerate machinery analysis skills.

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