

VIBRATION SIMULATING SOFTWARE

To-Learn Vibe



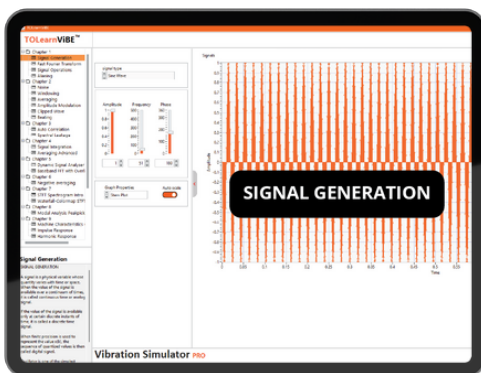


To Learn Vibe is an advanced educational software designed to simulate and analyze various aspects of vibration and signal processing. Tailored for learners and professionals in the field of vibration analysis, this software offers a hands-on approach to understanding complex signal behaviors, fault diagnostics, and system dynamics.

Key Features

Chapter 1: Signal Generation & Analysis

- **Signal Generation:** Simulate sine, triangle, square, and sawtooth waves. Adjust amplitude, frequency, and phase to explore signal behavior.
- **Fast Fourier Transform (FFT) Analysis:** Perform FFT on simulated signals to analyze their frequency spectrum, with adjustable sample rate and resolution. Includes Power Spectrum plotting with dB scale visualization.
- **Signal Operations:** Add or subtract signal profiles to understand composite signals. Visualize results using various graph types.
- **Aliasing:** Simulate signals with varying frequencies to observe aliasing effects and the importance of anti-aliasing filters.



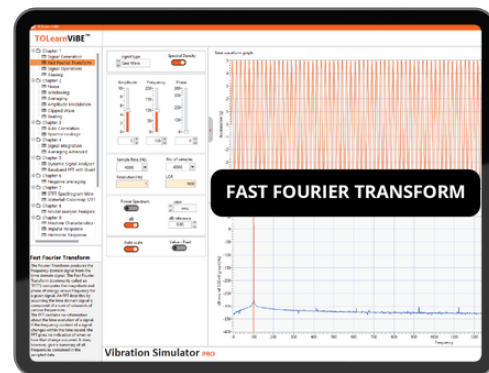
Chapter 2: Noise & Modulation

- **Noise Simulation:** Simulate different types of noise (e.g., Uniform White, Gaussian White, Periodic Random) and observe their effects on signals.
- **Windowing Techniques:** Apply various window functions (Hamming, Hanning, Blackman) to understand their impact on spectral content and resolution.
- **Averaging Techniques:** Implement RMS and Peak hold averaging methods on noisy signals with different window applications.
- **Amplitude Modulation:** Visualize how varying the amplitude of a carrier wave affects signal transmission and reception.
- **Clipped Wave Analysis:** Explore the effects of signal clipping, with options to toggle between single and double-sided clipping.
- **Beating Phenomenon:** Simulate the beating effect from the superposition of two signals with slightly different frequencies.



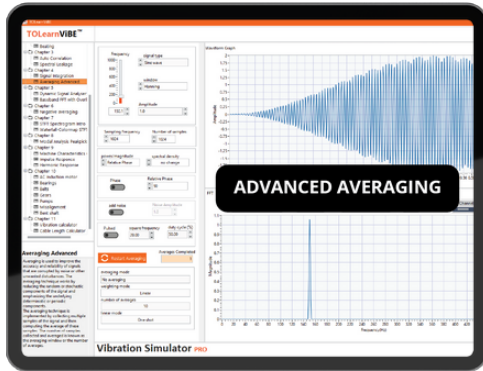
Chapter 3: Advanced Signal Analysis

- **Auto-Correlation Techniques:** Analyze signal periodicities by exploring auto-correlation functions with noise integration.
- **Spectral Leakage:** Understand spectral leakage effects and mitigation techniques through windowing.



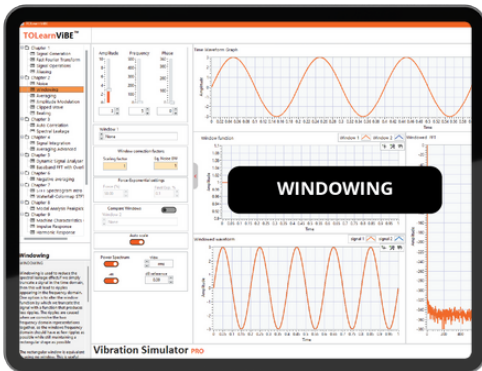
Chapter 4: Signal Integration & Advanced Averaging

- Signal Integration: Analyze how signal integration works on simple sine and multi-tone presets, and compare FFT results.
- Averaging Advanced Techniques: Toggle between various signals (sine, square, chirp, pink noise) and implement advanced averaging methods.



Chapter 5: Dynamic Signal Analysis

- Dynamic Signal Analyzer (DSA): Simulate and analyze different signal types (sine, chirps, Gaussian white noise) using spectrum analysis, cross power spectrum, and Nyquist plots.
- Baseband FFT with Overlap: Explore FFT with overlapping windows for high-resolution frequency analysis.

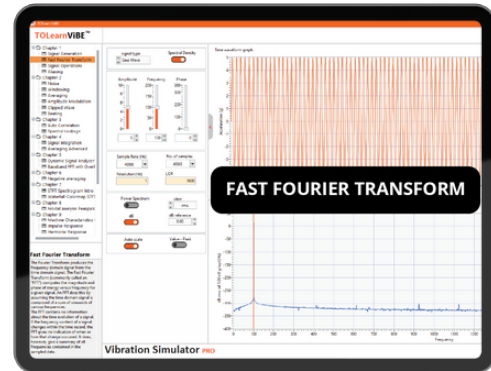


Chapter 6: Negative Averaging

- Negative Averaging Techniques: Learn the concept of negative averaging by triggering simulated signals.

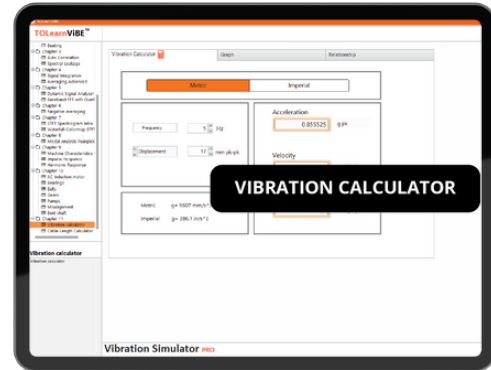
Chapter 7: Time-Frequency Analysis

- STFT Spectrogram Introduction: Analyze time-varying signals with Short-Time Fourier Transform, visualized through spectrograms.
- Waterfall-Color Map STFT: Explore time-frequency analysis using waterfall and color map visualizations.



Chapter 8: Modal Analysis

- Modal Analysis Peak Picking: Identify resonant frequencies and mode shapes through peak-picking techniques.

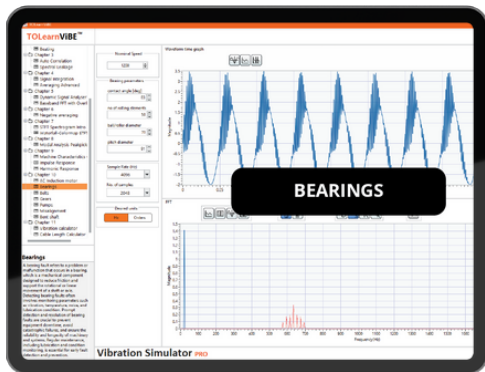


Chapter 9: System Dynamics

- Machine Characteristics Calculator: Calculate fault frequencies for bearings, belts, gears, motors, and pumps by inputting machine parameters.
- Impulse Response: Visualize system changes in real-time by adjusting spring constant, damping coefficient, and mass.
- Harmonic Response: Analyze dynamic systems under periodic inputs using harmonic response visualization tools.

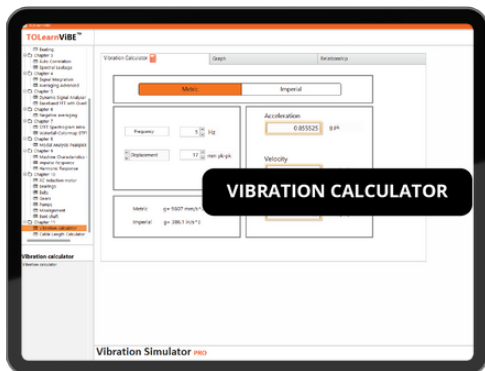
Chapter 10: Fault Signature Analysis

- AC Induction Motor Fault Signature: Simulate and analyze fault signatures of AC induction motors by varying motor parameters.
- Bearing Faults: Diagnose bearing issues by simulating and analyzing outer race, inner race, and cocked bearing faults.
- Belt Faults: Simulate common belt faults and vary parameters to analyze fault signatures.
- Gear Fault Simulation: Analyze gear faults such as worn gears and broken teeth under varying operational conditions.
- Pump Faults Simulation: Explore pump dynamics by simulating fault signatures and adjusting pump parameters.
- Misalignment Simulation: Analyze radial and axial misalignment faults through vibration spectra and time-domain plots.
- Bent Shaft Fault Signature: Simulate bent shaft issues and visualize fault signatures as speed changes.



Chapter 11: Calculation Tools

- Vibration Calculator: Convert amplitude and frequency inputs into various engineering units.
- Cable Length Calculator: Determine the maximum cable length for charge-amplifier style accelerometers.



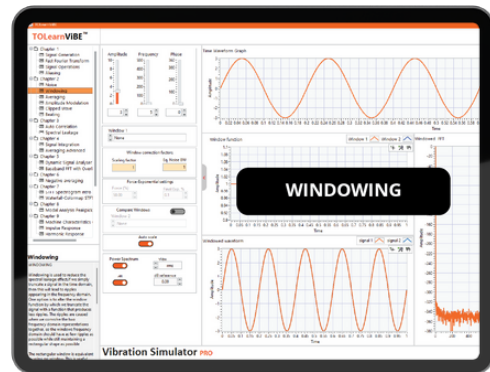
Chapter 12: Waveform Analysis

- Load Waveforms: Load and compare up to four different fault signatures simultaneously for comprehensive analysis.
- Sound Acquisition: Capture real-time audio signals with adjustable parameters, averaging, and filtering techniques.



Chapter 13: Advanced Vibration Diagnostics

- Bearing Fault Analysis: Generate and analyze signals related to inner and outer race bearing faults using advanced tools like auto-correlation and envelope analysis.
- Vibration Periodic Table: Access a structured periodic table format to explore 35 basic vibration faults and their variations.



Choose your subscription Plan

TOL Vibe	Beginner	Intermediate	Advanced
Chapter 1			
Signal Generation	✓	✓	✓
Fast Fourier Transform Analysis	✓	✓	✓
Signal Operations	✓	✓	✓
Aliasing	✓	✓	✓
Chapter 2			
Noise	✓	✓	✓
Windowing	✓	✓	✓
Averaging	✓	✓	✓
Amplitude Modulation	✓	✓	✓
Clipped Wave	✓	✓	✓
Beating	✓	✓	✓
Chapter 3			
Autocorrelation			✓
Spectral Leakage	✓	✓	✓
Chapter 4			
Signal Integration	✓	✓	✓
Averaging advanced		✓	✓
Chapter 5			
Dynamic Signal Analyzer		✓	✓
Baseband FFT with Overlapping		✓	✓
Chapter 6			
Negative Averaging		✓	✓
Chapter 7			
STFT Spectrogram intro			✓
Waterfall Colour map STFT			✓
Chapter 8			
Modal Analysis Peak Picking			✓
Chapter 9			
Machine Characteristics	✓	✓	✓
Impulse Response	✓	✓	✓
Harmonic Response		✓	✓
Chapter 10			
AC Induction Motor		✓	✓
Bearings		✓	✓
Belts		✓	✓
Gears		✓	✓
Pumps		✓	✓
Misalignment		✓	✓
Bent Shaft		✓	✓
Chapter 11			
Vibration Calculator	✓	✓	✓
Cable length Calculator	✓	✓	✓
Chapter 12			
Load waveforms			✓
Sound acquisition			✓
Chapter 13			
Bearing Fault Analysis			✓
Vibration Periodic Table			✓

System Requirements

- **Operating System:** Windows 10 Or Above
- **Processor:** Intel i3 or equivalent AMD
- **Memory:** 4 GB RAM