



# MEASURING MECHANICAL & PYROSHOCK



**A Training Course for Successful Shock Measurement**

May 19-21, 2026 | Buffalo, NY | Presented by: Dr. Ted Diehl

 Including **ENDEVCO** sensors, electronics, and cables

 **PCB PIEZOTRONICS**  
AN AMPHENOL COMPANY

 **BODIE**  
TECHNOLOGY, INC.  
*The Noisy Data Experts™*



# MEASURING MECHANICAL & PYROSHOCK

## Lecture Topics

### 1. Introduction to the Measurement of Shock

- Brief introduction into the topic

### 2. A Brief Overview of Key DSP Fundamentals — Data Sampling, Avoiding Aliasing, FFT, Filtering

- Clearly explain issues with collecting analog signals digitally, avoiding aliasing, and common DSP tools

### 3. Accelerometer Types Used for Shock

- Key technology choices including sensing type (PR & ICP®), mechanical isolation, and onboard analog filtering

### 4. System Requirements for Shock Measurements

- Typical components in a measurement system and guidance in setting up a valid measurement

### 5. Accelerometer Mounting & Cable Routing

- How cables can add unwanted noise and lowpass filtering effects, and how to avoid this

### 6. Brief Overview of Shock Response Analysis (SRS)

- Explanation of Absolute Acceleration SRS and PVSS (Pseudo Velocity Shock Spectrum), what are they and how to use them
- Advantages of making 4CP (four coordinate paper) plots for PVSS

### 7. Accelerometer Related Data Errors

- Discuss causes of zero-shifting and other data errors in accelerometer measurements
- Review several examples that demonstrate common signal signatures of data errors

### 8. Post Processing of a Typical Shock Measurement

- Demonstrate typical calculations done on measured acceleration data
- Includes Importance of using DSP properly in data processing of shock

## 9. Comparing Different Accelerometer's Performance During Severe Impact

- Assess both PR and ICP® accelerometer performance under similar severe shock conditions

## 10. Comparing Physical Measurements with Numerical Simulations

- Outline the key differences between tests and simulations that cause apparent discrepancies
- Describe proper workflows and calculations to have the best chance of correlation in both the time domain and frequency domain

## 11. From Planning to Measurement Validation: A Severe Shock Case Study

- A guided class activity to explore planning, performing, analyzing, and validating a severe shock test

## 12. Pushing Accelerometers Beyond Their Design Limits: The Out-of-Band Energy Problem

- Explore how unmeasured out-of-band energy in both amplitude and frequency creates a gray zone that can distort severe shock measurements
- Learn how advanced post-processing techniques can help reveal and mitigate these effects

## 13. Summary of Best Practices for Transient Accelerometer Measurements of Mechanical Shock

- Summary of the key course take-aways

## 14. Interactive Beam Shock Live Testing Experience

**NEW!**

- Two-loop format: observe the initial measurements to identify common problems, watch as corrective setup changes are applied, and compare re-measurements that demonstrate the resulting improvements
- Participate in an interactive group discussion and critique measurement trade-offs—including sensor selection, mounting approach, test execution, and data assessment—to understand how those choices affect measurement integrity

## At This Training, You Will Learn:

- Recommended approaches and challenges for making transient acceleration measurements of severe mechanical shock and pyroshock
- Key technology choices related to piezoresistive and ICP® transducers
- The importance of proper cabling and signal conditioning, especially for tests requiring long cables
- Various causes that distort measurements with high frequency noise, zero shifts, and/or other problems
- The importance of proper DAQ selection, sampling rates, and filtering (both analog and digital)
- The dangers of aliasing and how to avoid it
- Suggested workflows to process measured accelerometer data including calculations to help assess measurement plausibility, methods to check for signal distortions, and approaches to minimize them
- What Shock Response Spectra is, how to calculate it, and why PVSS analysis is such a powerful way to assess accelerometer data



**Ted Diehl, PhD**  
President and CEO, Bodie Technology, Inc.



Ted is responsible for strategy and technology development for Bodie Tech and is the developer of the Kornucopia® ML™ software tool suite. He is also a Corporate Fellow at Magic Leap, Inc.

Ted has been an active participant in FEA and Physical Testing community for over 30 years, representing companies in several industries. His primary focus is developing methods to solve industrial problems through a creative, yet pragmatic, mix of experimental, computational, and theoretical approaches. Dr. Diehl pioneered many FEA-oriented digital signal processing algorithms, initially for use in cell-phone impact mechanics, and then expanded to a host of noisy data problems for both physical testing and transient FEA simulations. Dr. Diehl received his PhD in Mechanical Engineering from the University of Rochester.



This training is designed for test personnel and their managers; design and analysis staff who use test measurements for model, component and full-scale system verification; calibration laboratory staff; data reduction personnel; and more generally anyone whose work depends on the output from accelerometers for the measurement of severe mechanical shock and pyroshock.



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