95TH SHOCK & VIBRATION SYMPOSIUM

SEPTEMBER 21-25, 2025

INSIDE COVER - PURPOSEFULLY LEFT BLANK

Welcome

WELCOME TO NEW ORLEANS AND THE 95TH SHOCK AND VIBRATION SYMPOSIUM!

Since the first meeting in 1947, the Shock and Vibration Symposium has become the oldest continual forum dealing with the response of structures and materials to vibration and shock. The symposium was created as a mechanism for the exchange of information among government agencies concerned with design, analysis, and testing. It now provides a valuable opportunity for the technical community in government, private industry, and academia to meet and discuss research, practices, developments, and other issues of mutual interest.

The symposium is presented by the **Shock and Vibration Exchange**.

Thank You

WE WOULD LIKE TO RECOGNIZE OUR TECHNICAL ADVISORY GROUP (TAG) MEMBERS WHO PARTICIPATED ON THE 95TH SHOCK AND VIBRATION SYMPOSIUM SUMMER PLANNING COMMITTEE AND/OR AWARD REVIEW COMMITTEE:

Dr. Robert Browning, Battelle
Justin Caruana, Cardinal Engineering*
Frederick Costanzo, FAC Engineering Consultant**
Shawn Czerniak, Hutchinson*
Dr. Jason Foley, AFRL**
Matt Forman, NSWC Dahlgren*
Rebecca Grisso, NSWC Carderock*
Dr. Mike Hale, Redstone Test Center**
Adam Hapij, Thornton Tomasetti*
Kurt Hartsough, 901E&T*
Roger Ilamni, NSWC Indian Head*
Alan Klembczyk, Taylor Devices*
Brian Lang, NSWC Carderock*/**
Kenneth Lussky, BAE Systems*
Luke Martin, NSWC Dahlgren*/**
Bob Metz, PCB Piezotronics*
Jeff Morris, HI-TEST Laboratories**
Calvin Milam, Element US Space & Defense*/**
Michael Olsen, HII Newport News Shipbldg*
Drew Perkins, SAVE/HI-TEST*
Ashley Shumaker, SAVE/HI-TEST*
Ernie Staubs, Air Force Research Lab*/**
Dr. Michael Talley, HII-NNS**
Mackenzie Wilson, HII-NNS*
Lauren Yancey, HI-TEST Laboratories*
Bill Yancey, HI-TEST Laboratories**

**TAG members in attendance at summer meeting for 95TH S&V program review.*
***TAG members who peer-reviewed award nomination packages*

Thank You

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LITTLE MOUNTAIN TEST FACILITY SHOCK & VIBE LAB

SPECTRAL DYNAMICS

taylor devices inc.

Viper Applied Science

Schedule at a Glance

(WITH DAILY OUTLINE AND HOURS)

DAY/DATE	PROGRAM FEATURE TYPE	TIME	PAGE
SUNDAY (09/21)	REGISTRATION (SOUTHDOWN)	8:00AM - 5:00PM	
	TUTORIALS	8:00AM - 4:00PM	PG. 7
MONDAY (09/22)	REGISTRATION (SOUTHDOWN)	7:00AM - 6:00PM	
	TUTORIALS	8:00AM - 6:30PM	PG. 8-13
	EXHIBIT HALL SETUP (NAPOLEON BALLROOM)	NOON - 6:00PM	
	WELCOME RECEPTION (NAPOLEON BALLROOM)	6:30PM - 8:30PM	PG. 14
TUESDAY (09/23)	REGISTRATION (SOUTHDOWN)	7:00AM - 6:00PM	
	EXHIBIT HALL OPEN (NAPOLEON BALLROOM)	7:00AM - 5:00PM	
	TUTORIALS	8:00AM - 11:00AM	PG. 16-17
	GENERAL SESSION I & EXHIBITORS LUNCHEON	11:00AM - 1:00PM	PG. 20-21
	TECHNICAL PAPER SESSIONS & TRAINING	1:00PM - 5:45PM	PG. 22-25
	NEW ENGINEERS & ATTENDEES NETWORKING	6:00PM - 7:00PM	PG. 26
WEDNESDAY (09/24)	REGISTRATION (SOUTHDOWN)	7:00AM - 6:00PM	
	TECHNICAL PAPER SESSIONS & TRAININGS	8:00AM - NOON	PG. 28-31
	EXHIBIT HALL OPEN (NAPOLEON BALLROOM)	9:00AM - 4:00PM	
	GENERAL SESSION II & AWARDS LUNCHEON	NOON - 1:30PM	PG. 32-33
	TECHNICAL PAPER SESSIONS & TRAININGS	1:30PM - 3:30PM	PG. 34-35
	TUTORIALS	3:30PM - 6:30PM	PG. 36-37
	EXHIBIT HALL DISMANTLE	4:15PM - 6:00PM	
	COMMERCIALLY SPONSORED SOCIAL EVENT	7:00PM - 10:00PM	PG. 38-39
THURSDAY (09/25)	REGISTRATION (SOUTHDOWN)	7:00AM - NOON	
	TECHNICAL PAPER SESSIONS & TRAININGS	8:00AM - 12:05PM	PG. 40-43
	S&V TAG COMMITTEE MEETING (MTG ROOM)	1:00PM - 2:00PM	PG. 43
	EXHIBIT HALL LAYOUT & VENDOR DESCRIPTIONS		PG. 44-51
	HOTEL MEETING SPACE FLOOR PLANS		PG. 52-54
	CORPORATE ADS		PG. 55-62

Food & Beverage Events

(ALL SYMPOSIUM ATTENDEES ARE WELCOME TO ATTEND EVENTS LISTED BELOW)

MONDAY (09/22)	**WELCOME RECEPTION** (NAPOLEON BALLROOM / EXHIBIT HALL) *BEVERAGES & HEAVY HORS D'OEUVRES* **GUESTS OF SYMPOSIUM ATTENDEES ARE WELCOME.*	6:30PM - 8:30PM
TUESDAY (09/23)	**BREAKFAST & NETWORKING** (NAPOLEON BALLROOM / EXHIBIT HALL)	7:00AM - 8:00AM
	GENERAL SESSION 1: KEYNOTE ADDRESS & EXHIBITORS LUNCHEON (NAPOLEON BALLROOM / EXHIBIT HALL)	11:00AM - 1:00PM
	ICE CREAM SOCIAL (NAPOLEON BALLROOM / EXHIBIT HALL)	3:00PM - 3:40PM
WEDNESDAY (09/24)	**BREAKFAST & NETWORKING** (NAPOLEON BALLROOM / EXHIBIT HALL)	7:00AM - 8:00AM
	GENERAL SESSION 2: AWARDS PRESENTATION AND LUNCHEON (NAPOLEON BALLROOM / EXHIBIT HALL)	NOON - 1:30PM
	AFTERNOON DESSERT BREAK & PASSPORT PROGRAM DRAWING (NAPOLEON BALLROOM / EXHIBIT HALL)	3:05PM - 3:40PM
	SYMPOSIUM SOCIAL/DINNER AT NATIONAL WWII MUSEUM **COMMERCIALLY SPONSORED BY HI-TEST LABORATORIES** **GUESTS OF SYMPOSIUM ATTENDEES ARE WELCOME.*	7:30PM - 9:30PM
THURSDAY (09/25)	**BREAKFAST & NETWORKING** (NAPOLEON BALLROOM / EXHIBIT HALL)	7:00AM - 8:00AM

**PLEASE NOTE THAT ALL MEALS ARE COMMERCIALLY SPONSORED THROUGH EXHIBITOR AND CORPORATE SUPPORTER REVENUES. NO COSTS FOR MEALS ARE DIRECTLY INCLUDED IN INDIVIDUAL ATTENDANCE FEES.*

SAVE
SHOCK & VIBRATION EXCHANGE

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TUTORIAL SESSION I
8:00 - 11:00AM

MIL-DTL-901E SHOCK QUALIFICATION TESTING
Kurt Hartsough (901 E&T)

BAYSIDE A

Instructor will be presenting the requirements for shock qualification testing as detailed in MIL-DTL-901E and interpreted by NAVSEA 05P1. Shock testing theory, MIL-DTL-901E shock test devices and facilities, detailed specification requirements, cost avoidance and clarification and MIL-DTL-901E IC#2 will be covered. Attendees should include anyone involved in the acquisition, specification, review and approval of Navy shipboard equipment including PARMs and LCMs and contracting officers, contractors having to deal with the Navy and wishing to supply shock qualified equipment to the Navy, Ship Program Managers and Ship Logistic Managers responsible for the acquisition & maintenance of shock hardened Navy ships and shock qualification test facilities.

TUTORIAL SESSION II
1:00 - 4:00PM

MIL-DTL-901E SHOCK QUALIFICATION TESTING EXTENSIONS
Kurt Hartsough (901 E&T)

BAYSIDE A

Instructor will be presenting the requirements for shock qualification extensions as detailed in MIL-DTL-901E and interpreted by NAVSEA 05P1. Shock extension specification requirements, MIL-DTL-901E design guidelines and shock design lessons learned will be covered. Attendees should include anyone involved in the acquisition, specification, review and approval of Navy shipboard equipment including PARMs and LCMs and contracting officers, contractors having to deal with the Navy and wishing to supply shock qualified equipment to the Navy, Ship Program Managers and Ship Logistic Managers responsible for the acquisition & maintenance of shock hardened Navy ships and shock qualification test facilities.

OPTIONAL THREE HOUR COURSES. ATTENDEES WILL RECEIVE A CERTIFICATE OF COMPLETION AND MAY RECEIVE CEUs/PDHs (VARIES BY STATE). ADDITIONAL FEES APPLY TO ATTEND.

MONDAY
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TUTORIAL SESSION III
8:00 - 11:00AM

OPTIONAL THREE HOUR COURSES. ATTENDEES WILL RECEIVE A CERTIFICATE OF COMPLETION AND MAY RECEIVE CEUs/PDHs (VARIES BY STATE). ADDITIONAL FEES APPLY TO ATTEND.

MIL-DTL-901E SUBSIDIARY COMPONENT SHOCK TESTING & ALTERNATIVE TEST VEHICLES
Kurt Hartsough (901 E&T)

BAYSIDE A/B

The MIL-DTL-901E Subsidiary Component Shock Testing and Alternate Test Vehicles course will cover the following areas: NAVSEA 05P1's current policy for testing subsidiary components, description of test environment requirements, examples of recent successful test programs, alternate test vehicle descriptions, alternate test vehicle limitations, discussions on shock spectra, Multi-Variable Data Reduction (MDR) and various shock isolation systems. This course is intended to give the necessary information to equipment designers and program managers who intend to shock qualify COTS equipment that will require frequent upgrades due to obsolescence, equipment upgrades, change in mission, etc. Although not required, it is recommended that those attending this course also attend courses on Shock Policy, MIL-DTL-901E testing and particularly MIL-DTL-901E extensions offered by the same instructor (Hartsough).

FUNDAMENTALS OF SINE AND RANDOM SHAKER TESTING
Chris Sensor (Siemens)

BORGNE

This tutorial will cover the fundamental concepts of shaker Sine and Random vibration testing. Swept Sine, Sine Dwell, Random, Sine-on-Random, Random-on-Random and Time Waveform Replication test modes will be covered. Additional topics such as response limiting, control channel averaging, kurtosis, and practical shaker considerations will also be discussed. Subjects will be accompanied by live demos of shaker tests, with opportunities for hands on participation by attendees.

ANALYSIS FOR A MEDIUM WEIGHT SHOCK TEST
Josh Gorfain (Quartus Engineering)

MAUREPAS

While a shock test is essentially the bottom line for a shock qualification, a lot of analysis often goes into the mix before the test. The reasons for this are many: The equipment manufacturer wants his equipment to pass and will often commission some kind of pre-test prediction to maximize the likelihood of success or to high-light design problems. Since the weight and frequency of the tested equipment can affect the response of the test significantly, the system may need to be examined to assure that the tested environment is correct. This tutorial will first review the Medium Weight Shock Machine (MWSM) and its use in shock qualification testing, followed by presentation of the test environment. Next, the types of analysis that can be performed to estimate the test environment experienced by a given piece of equipment will be described. The intention of these analyses is to provide an assessment of equipment response subject to a MWSM test in an effort to assure a successful test. Additionally, the merits and limits of these methods are discussed so the most appropriate method may be rationally selected for a given application. Examples will be presented that illustrate the different types of analyses and how they may be applied.

PLANNING LIFE CYCLE DESIGN, ANALYSIS, AND SHOCK AND VIBE QUALIFICATION OF NAVY EQUIPMENT

BAYSIDE C

Dr. Christopher Merrill (CM&A Engineering)

This tutorial provides general simple techniques for use in parallel with long term Classical and Numerical Dynamic Analysis of Systems subjected to US Navy shock and vibration requirements over Navy equipment life cycles to maximize accuracy and minimize errors in Dynamic Analysis and Qualification of electronic and mechanical systems. The interaction of the US Navy shock and vibration requirements is a major driver of the efficacy of long-term Dynamic Analysis from the start. Apart from major issues that occur on any major long-term developmental programs, simple, seemingly minor, errors present in the analysis from the beginning can lead to huge cost and schedule impacts generally at the worst time for the program (FAT). Fortunately, there are procedural long-term Dynamic Analysis Quality Control techniques that can be used from the beginning and in parallel during the long-term dynamic analysis to mitigate the risk of such errors. This tutorial will provide examples of types and genesis of such errors, as well as, a process to perform at the beginning and in parallel with the long-term dynamic analysis in order to perform quality control comparisons to mitigate these errors. Finally, the importance of comparison of FAT dynamic test results to dynamic analysis including failure and use of prototyping will be included. The tutorial will end with an exercise where the trainer will attempt to stump the trainee with balky computer model results. The trainee will leave the tutorial with a list of types and genesis of discrete and basic errors, a process chart and algorithm for applying these Quality Control Techniques at the start and in parallel with the long-term dynamic analysis, and insight on improving techniques for planning Life Cycle Design, Analysis, and Shock and Vibe Qualification of Navy Equipment.

MONDAY
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TUTORIAL SESSION IV
NOON - 3:00PM

OPTIONAL THREE HOUR COURSES. ATTENDEES WILL RECEIVE A CERTIFICATE OF COMPLETION AND MAY RECEIVE CEUs/PDHs (VARIES BY STATE). ADDITIONAL FEES APPLY TO ATTEND.

AN INTRODUCTION TO ALIASING, FFT, FILTERING, SRS & MORE FOR FEA USERS AND TEST ENGINEERS

MAUREPAS

Dr. Ted Diehl (Bodie Technology)

Working with either physical test data and/or numerical simulations related to severe mechanical shock, impact, failure, etc. is extremely challenging. Some of the biggest challenges in this type of work are 1) properly collecting the initial raw data while avoiding aliasing [especially from numerical simulations], 2) utilizing robust methods to identify and separate the "noise & distortions" from the "true" frequency-rich content in the data, and 3) determining what portion of the "true" frequency-rich content is meaningful and what does it tell you. For a given problem, the initial appearance of raw time-domain data in this class of work may be vastly different between physical testing and data derived from transient simulation codes (LS-Dyna, Abaqus/Explicit, RADIOSS…). While the data might look different, the rules of DSP (Digital Signal Processing) are the same. Most importantly, understand and utilizing DSP properly is a critical requirement to success in BOTH types of approaches, especially to obtain correlation between physical tests and simulation of the same specific problem.

The 3-hour seminar provides guidance to both simulation analysts and test engineers on how to properly collect and process such data; ultimately uncovering significantly improved results. The course covers highlights of DSP theory in the language of Mechanical Engineering pertinent to simulation analysts and test engineers. This seminar introduces key aspects of working with transient data – specifically, clearly explaining time-domain and frequency domain analysis (DFS, FFT, PSD); data collection (sampling, up-sampling, decimation, and aliasing); filtering (lowpass, highpass, IIR, and FIR), how to avoid aliasing, calculating Shock Response Spectrum (Accel SRS & PVSS) from transient data, and numerous unique aspects related to explicit dynamics FEA data (non-constant time increments, massively over-sampled data, short transient signals with non-zero end conditions, and more). Simplified demonstrations are presented to solidify key DSP aspects, along with many relevant real-world examples. Both FEA users and experimentalists will benefit from this training.

DATA INTEGRITY

BAYSIDE C

John Hiatt (DEWESoft)

The data integrity training is designed as an overview of the data acquisition process and how each step in the measurement chain can affect your measured data. Primary focus of this session is on the data acquisition system (DAS). We will learn what happens in each step of the process and how to mitigate common measurement errors. The idea is to get the best possible data first time. Its hard to make good decisions with bad data. We also cover DAS specifications so users can be better prepared to compare system specifications.

FUNDAMENTALS OF CLASSIC SHOCK AND SRS SHAKER TESTING

BORGNE

Chris Sensor (Siemens)
Bob Metz (PCB Piezotronics)

This tutorial will cover the fundamental concepts of shaker shock testing, from field data acquisition to Classic Shock and Shock Response Spectrum (SRS) wavelet synthesis in a vibration controller. The tutorial will cover shock data acquisition and analysis, classic shock pulses, SRS concepts, SRS and Pseudo Velocity Shock Spectrum (PVSS) data analysis, a review of Classic Shock and SRS test methods in MIL-STD-810H (including the "new" method of Te and TE), shock test tailoring and SRS wavelet synthesis for shaker SRS testing. A segment covering specialty shock sensors and instrumentation will also be presented. Subjects will be accompanied by live demos of data acquisition and shaker tests, with opportunities for hands on participation by attendees.

EFFECTIVE SOLUTIONS FOR SHOCK AND VIBRATION CONTROL

OAK ALLEY

Alan Klembczyk (Taylor Devices)
Ken Lussky (BAE Systems)

Part 1 of this Tutorial provides an outline of various applications and methods for implementing isolation control of dynamic loads and damping within a wide array of dynamic systems and structures. Photos, videos, and graphical results are presented of solutions that have been proven effective and reliable in the past. Design examples are given and typical applications are reviewed. Additionally, key definitions and useful formulae are presented that will provide the analyst or systems engineer with the methods for solving isolation problems within the commercial, military, and aerospace sectors. A wide range of isolation mounts and systems are covered including liquid dampers, elastomer and wire rope isolators, tuned mass dampers, and engineered enclosures. Engineering guidelines are presented for the selection and evaluation of isolation control products.

Part 2 of this Tutorial addresses characterization of shock and vibration environments and finite element analysis (FEA) of shock and vibration isolation performance. Methods used to characterize shock and vibration responses and their application are defined. For shock these include spectral definitions (SRS shock response spectrum and PVSS pseudo velocity shock spectrum) and time-history definitions (peak velocity, peak acceleration, average acceleration and displacement). These are discussed with respect to their application to shock input severity, and equipment fragility and damage potential. Shock test qualification methods, their input definitions, and how they are represented in FEA are discussed. Also addressed are the value of damping in shock isolation and how shock and vibration isolation systems are represented in FEA. For vibration the spectral definition of Acceleration Spectral Density (ASD) is discussed. Other topics addressed are the application of UERD Tools for shock characterization, and when to engage with the appropriate shock and vibration Technical Warrant Holders (TWH).

CANCELLED

BAYSIDE A/B

~~**A PRIMER ON VIBRATION TESTING AND DATA ANALYSIS**~~
~~Dr. Luke Martin (NSWC Dahlgren)~~

~~This tutorial will give an introduction to vibration testing and will be concept focused. The tutorial will begin with an understanding of a typical laboratory vibration test setup, followed by a deeper dive of the fundamental components. Specifically, a typical single degree of freedom vibration test will be decomposed into its pieces: amplifier, shaker, slip table, test item, vibration controller, and reference profiles. Once the components of the control loop are understood, the tutorial will focus on data analysis required by both the vibration controller to conduct a test and by a user who wishes to use measured field data to develop a tailored vibration test profile.~~

~~Along the way concepts that will be covered are: electrodynamic shakers, servo-hydraulic shakers, single degree of freedom testing, multiple degree of freedom testing, control vs measurement transducers, Miner's Rule, sinusoidal testing, random testing, mixed mode testing, MIL-STD-167, MIL-STD-810, need for tailored vibration data, and digital signal processing used for data analysis.~~

MONDAY
SEPTEMBER 22

TUTORIAL SESSION V
3:30 - 6:30PM

OPTIONAL THREE HOUR COURSES. ATTENDEES WILL RECEIVE A CERTIFICATE OF COMPLETION AND MAY RECEIVE CEUs/PDHs (VARIES BY STATE). ADDITIONAL FEES APPLY TO ATTEND.

DDAM 101
George D. (Jerry) Hill (SERCO)

BORGNE

The U.S. Navy Dynamic Design Analysis Method (DDAM) has been in general use since the early 1960s. It is a method of estimating peak shock response of equipment and outfitting on naval combatants using normal mode theory, originally extended from earthquake analysis methods. The DDAM requires linearelastic model behavior and employs a statistical method of modal superposition yet has persisted to today as the U.S. Navy required method for shock qualification by analysis. This, in spite of the rapid advancement of dynamic transient simulation technology and techniques for representing nonlinearities including material plasticity and contact behavior. The tutorial will address: how the method works, how the shock spectral input values are presented in DDS-072-1, what is the role of modal weights and participation factors, why has the method persisted including what are its strengths and also what are its weaknesses. The tutorial will provide a basic understanding of the method, requirements, and procedures to those who expect to be involved in shock analysis and will demystify the procedure for many who are current users.

DIGITAL SIGNAL PROCESSING - FILTERING AND THE FOURIER TRANSFORM (GOING FROM TIME TO FREQUENCY DOMAIN)
John Hiatt (DEWESoft)

BAYSIDE C

Two of the most common Digital Signal Processing (DSP) techniques are filtering and transforming data from the time domain to the frequency domain with the Fourier transform (FFT). Both mathematical processes can create unwanted effects on the data. This session will examine these effects on your data and how they can be mitigated. For the Fourier transform, we will also discuss the assumptions, inputs to the FFT and possible reasons FFT's calculated with two different software packages do not match. This training is designed to help new users understand how these processes and how they work to help prevent data processing mistakes.

INTRODUCTION TO MIL-STD-461 ELECTROMAGNETIC INTERFERENCE TESTING
Jeff Viel (Element US Space & Defense)

MAUREPAS

This 3 hour tutorial provides a detailed technical overview of MIL-STD-461G addressing the electromagnetic interference (EMI) emission and susceptibility test methods and control requirements for subsystems and equipment and subsystems designed or procured for the Department of Defense (DoD). This tutorial starts from the very beginning discussing the basis for EMI control testing, including a historical case study, to the progressive development of test methods and requirements adapted to modern day technologies and electromagnetic environments. While the standard is broadly designed to address all DOD platforms, this tutorial is focused to specifically address shipboard and submarine application requirements.

AIR BLAST AND CRATERING: AN INTRODUCTION TO THE ABC'S OF EXPLOSION EFFECTS IN AIR AND ON LAND

BAYSIDE A/B

Denis Rickman (USACE ERDC)

This three-hour course introduces the effects of explosions in air and on land. Topics covered include airblast, soil/rock/pavement cratering, and ground shock phenomena produced by explosive detonations. There is a little math, but for the most part, the focus is on aspects and principles that are of practical use to those conducting (and utilizing) blast-related research. Most researchers in the blast arena have some grasp of explosion effects fundamentals, but very few have a good, broad-based understanding of how it all works. The goal is to provide the participants with enough of an understanding that they can appreciate the various explosion phenomena and those parameters that affect blast propagation and blast loading of objects in a terrestrial setting.

CENTRAL LIMIT THEOREM AND THE PROBABILITY DISTRIBUTION OF STRUCTURAL RESPONSE

OAK ALLEY

Dr. Thomas Paez (Thomas Paez Consulting)

It is frequently stated that random structural responses (and even excitations) are governed by a Gaussian distribution because of the effects of the Central Limit Theorem (CLT). It is, however, seldom proven. The usual claim underlying the assertion is that when a random phenomenon is the result of the superposition of a large number of independent, identically distributed random components, the CLT applies. Whether or not a structural response is governed by a Gaussian distribution is not just a matter of curiosity; some random vibration analyses are accurate only when the response is Gaussian. There are several versions of the CLT, each a bit more general and realistically applicable than the previous one. This presentation, first, develops some background materials in probability and structural dynamics; the objective is to permit development of the ideas of the CLT. The presentation then proves a simple version of the CLT. The proof relies on several definitions from probability theory and the use of the Fourier transform. It then proceeds to demonstrate more complex versions of the CLT. It so happens that the CLT is applicable even when the underlying random components are not all independent and not all identically distributed. In fact, even when a sum consists of a relatively small number of elements, the CLT may still hold approximately. The implications that all this holds for random vibration shaker testing in the laboratory are discussed. Numerous examples are included. Each participant will be given a link that may be used to download a color copy of the presentation slides, and MATLAB code to run the examples.

MONDAY
SEPTEMBER 22

Welcome Reception

HI-TEST Laboratories, Inc.

element U.S. Space & Defense

ALL SYMPOSIUM ATTENDEES AND GUESTS ARE INVITED TO ATTEND.

6:30 - 8:30PM
HEAVY HORS D'OEUVRES & DRINKS
NAPOLEON BALLROOM (EXHIBIT HALL)

SEPTEMBER 20 - 24 2026

Get ready!

- EXHIBITOR PROSPECTUS AVAILABLE DECEMBER 2025.
- SUBMIT ABSTRACTS BY JUNE 30, 2026.
- REGISTRATION BEGINS JUNE 2026.
- TECHNICAL PROGRAM AVAILABLE JULY 2026.

TUESDAY
SEPTEMBER 23

BREAKFAST + NETWORKING

7:00 - 8:00AM | EXHIBIT HALL

AFTER BREAKFAST, ENJOY THE OPPORTUNITY TO NETWORK WITH OTHER ATTENDEES AND INTERACT WITH EXHIBITORS.

TUTORIAL SESSION VI
8:00 - 11:00AM

OPTIONAL THREE HOUR COURSES. ATTENDEES WILL RECEIVE A CERTIFICATE OF COMPLETION AND MAY RECEIVE CEUs/PDHs (VARIES BY STATE). ADDITIONAL FEES APPLY TO ATTEND.

OVERVIEW OF UNDERWATER EXPLOSION PHENOMENOLOGY & BULK CHARGE WEAPON EFFECTS

OAK ALLEY

LIMITED DISTRIBUTION D (SECURITY PAPERWORK REQUIRED)

Greg Harris (Consultant)

This tutorial will provide an overview of underwater explosion (UNDEX) phenomenology relevant to bulk charge underwater warheads. The phenomenology discussion includes UNDEX shock wave propagation, bulk cavitation effects, and UNDEX bubble dynamics. UNDEX testing and analysis procedures for characterizing the shock wave and bubble performance of explosive compositions will be described. Finally, a brief discussion of the damage mechanisms used by bulk charge underwater weapons such as mines and torpedoes will be given using illustrative examples from UNDEX testing programs and recent naval encounters.

BLAST PRESSURE MEASUREMENT

BAYSIDE A/B

Troy Skinner (N2L, Inc.)
Bob Metz (PCB Piezotronics)
Denis Rickman (USACE ERDC)

When researchers collect poor blast pressure data, they often conclude “it must be the gauge!” Truth be known, sensors rarely insert themselves into a blast test. Instead, they bravely go into whatever location the test engineer commands, often producing poor data or worse, experiencing an untimely death. These brave, and costly, soldiers deserve better!

To make matters more complicated, there are two sensing technologies to choose from. Quartz piezoelectric and silicon MEMS piezoresistive transducers are both successfully used for air-blast pressure measurements. This tutorial will objectively compare strengths and weaknesses of MEMS piezoresistive and ICP piezoelectric pressure transducers focused only on their applicability to the air-blast environment. The analysis considers measurement errors found in air blast, which include thermal transients, acceleration/strain, and cable length effects. Transducer performance parameters of dynamic range, ruggedness/survivability, and frequency response will be compared.

INTRODUCTION TO DESIGNING SHOCK MOUNTED SYSTEMS USING SHOCK ISOLATION MOUNT PREDICTION & LOADING ESTIMATES (SIMPLE) SOFTWARE

BORGNE

Dave Callahan (HII Newport News Shipbuilding)

This course will introduce a process for designing and assessing shock isolation systems with emphasis on applications related to the design of shipboard equipment for shock loads produced by underwater explosions utilizing the analytical software tool “Shock Isolation Mount Prediction & Loading Estimates” (SIMPLE). This process is split into two parts: 1) initial analysis using classic Shock Response Spectrum (SRS) and 2) assessment, confirmation, iteration or comparison of isolation system designs using SIMPLE simulation methods. Attendees will learn how to build six Degree of Freedom (DOF) SIMPLE models of isolated systems, select shock mounts and modify mount properties, select shock inputs, evaluate the isolation system performance and iterate designs rapidly. This course is intended for anyone that desires validation and assurance that shock and vibration mounts are properly selected for equipment and structures using SIMPLE software. Examples of SIMPLE users are: engineers, program managers, integrators, analysts, mount vendors, and shock qualification reviewers/approvers.

TUTORIAL SESSION VI
8:00 - 11:00AM
(CONTINUED)

REMOVING THE BOUNDARY CONDITION HOBGOBLINS IN VIBRATION QUALIFICATION TESTING WITH MODAL TECHNIQUES

BAYSIDE C

Troy Skousen (Sandia National Laboratories)
Randy Mayes (Consultant)

How a modal technique provides a simple modification to the base input mitigating the field-to-laboratory impedance mismatch for high confidence component qualification

Random vibration laboratory testing is used to qualify components to survive in-service responses to system environments. Using realistic research hardware and an analytical rocket system, we show that traditional single degree of freedom (SDOF) shaker test specifications guarantees large response uncertainties when compared with the field environment responses due to the difference in laboratory boundary conditions. A brief review is provided showing how fixed-base mode shapes are derived from test data. A model utilizing fixed-base and rigid body modes of the component on its vibration test fixture is used to decompose the component field motion into a few intuitive responses. This model demonstrates why 6DOF laboratory control can eliminate large uncertainties in traditional SDOF testing with a corresponding boost in qualification confidence. In fact, the model leads to modified base inputs for a greatly improved SDOF or 3DOF test.

UNDERWATER EXPLOSION SHOCK PHYSICS AND ENGINEERING MECHANICS APPLICATIONS

MAUREPAS

Frederick A. Costanzo (FAC Engineering Consultant, LLC)

This tutorial begins by presenting a primer on underwater explosion (UNDEX) fundamentals and shock physics. This provides a basic introduction to those who are new to this field, and serves as a brief review for those with experience in this area. Included in this discussion are the features of explosive charge detonation, the formation and characterization of the associated shock wave, bulk cavitation effects, gas bubble formation and dynamics, surface effects and shock wave refraction characteristics. In addition, analyses of associated measured loading and dynamic response data, as well as descriptions of supporting numerical simulations of these events, are presented. Next, applications of UNDEX-induced shock wave loadings to simple floating structures are discussed, and response solutions are generated using engineering mechanics strategies. Included are Taylor Plate analogies applied to both air-backed and water-backed structures, along with the application of the conservation of momentum principle for estimating the vertical kickoff velocity of floating structures (Spar Buoy approach). Derivations of the governing equations associated with each of these solution strategies are briefly presented, along with a description of the solutions and appropriate ranges of applicability. To round out the tutorial, some special studies are presented that illustrate the power of applied numerical methods in the form of finite differences to obtain approximate solutions to some classical mechanics problems. These studies include the formulation of solutions associated with the computation of linear and nonlinear SDOF systems under dynamic loadings, shock response spectra (SRS), and introduction to the concepts of residual spectra and reactive spectra.

SAVE Awards & Nomination Instructions

Henry C. Pusey Best Paper Award

KEEP A LOOKOUT IN THE PROGRAM FOR THIS QR CODE! SCAN TO NOMINATE ANY PRESENTATION DESERVING OF OUR ANNUAL ***HENRY C. PUSEY BEST PAPER AWARD.*** FULL AWARD CRITERIA AND NOMINATION FORM AVAILABLE BY SCANNING THE QR CODE.

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Lifetime Achievement Award

THE LIFETIME ACHIEVEMENT AWARD IS BESTOWED TO A MEMBER OF THE SHOCK AND VIBRATION COMMUNITY WHO HAS MADE SIGNIFICANT TECHNICAL CONTRIBUTIONS TO THE FIELD WITH A LIFETIME OF CAREER DEDICATION.

REACH OUT TO DREW PERKINS OR ASHLEY SHUMAKER FOR ADDITIONAL AWARD CRITERIA AND/OR A NOMINATION PACKAGE FOR THIS PRESTIGIOUS AWARD.

Exhibitor Passport Program

HOW IT WORKS:

- Each Symposium attendee is given a "Passport" with a listing of participating exhibitors.
- Participating exhibitors are provided a custom stamp/sticker.
- As the attendees visit the participating exhibitors, exhibitors "stamp" the passport of the attendee.
- Attendees who collect the stamp of at least 20 participating vendors are entered into the drawing.
- Prizes range from gift cards to gadgets to new exhibitor products!
- *Drawing to be held during the Wednesday afternoon break (3:05 - 3:40pm).*

Thank You to the exhibitors participating in the Passport Program:

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TUESDAY
SEPTEMBER 23

EXHIBITORS LUNCHEON (GENERAL SESSION I) *WITH KEYNOTE ADDRESS* 11:00AM - 1:00PM

NAPOLEON BALLROOM

11:00AM—11:10AM **CALL TO ORDER**
Mr. Drew Perkins, SAVE / HI-TEST Laboratories

11:10AM—11:15AM **KEYNOTE INTRODUCTION**
Dr. Robert Browning, Battelle

11:15AM—NOON **KEYNOTE ADDRESS: *MAINTAINING U.S. TECHNICAL SUPERIORITY IN ENERGETICS TECHNOLOGY AND MUNITIONS***
Dr. Suhithi Peiris, Battelle

NOON—1:00PM **LUNCH**
FOLLOWED BY EXHIBITOR MEET & GREET

Exhibitor Meet & Greet

Enjoy time to peruse the exhibit hall and meet the vendors.

DON'T FORGET TO GET STARTED ON YOUR PASSPORT PROGRAM ENTRY FORM!
DRAWING TO BE HELD DURING WEDNESDAY'S AFTERNOON BREAK IN THE EXHIBIT HALL.
PRIZES TO INCLUDE:

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EXHIBITORS LUNCHEON
(GENERAL SESSION I)
WITH KEYNOTE ADDRESS
11:00AM - 1:00PM

TUESDAY
SEPTEMBER 23

Meet the Speaker

DR. SUHITHI PEIRIS
SENIOR RESEARCH LEADER, BATTELLE

"Maintaining U.S. Technical Superiority in Energetics Technology and Munitions"

Su joined Battelle in March 2022, where she is a Senior Research Leader and a member of the Technical Council, working mainly within the National Security business line. She leads ideation, writes proposals, and advises on work at Battelle's High Energy Research Laboratory Area (HERLA) in the Advanced Materials and Energetics Division.

Previously, she was the scientific and technical senior executive (ST), at Air Force Research Laboratory, Munitions Directorate, Eglin Air Force Base, Florida where she served as the principal scientific authority and independent researcher in the field of Enhanced Energy Effects relating to technology for producing, transporting, and coupling energy from munitions to targets (inclusive of high explosives, initiation sciences, damage mechanisms, penetration, and fuzing). In that role, she led the $53M Applied Research for the Advancement of S&T Priorities (ARAP) Enhanced Energy Effects (EEE) Program. She was detailed to the DoD Office of the Undersecretary of Research and Engineering, to lead the response to the FY20 NDAA Section 253 call for an Energetics Plan. She coordinated seven senior-executive-service led groups with feedback from the service labs to write and finalize the plan. The FY24 NDAA Sections 241-245 iterate some of the recommendations in that energetics plan.

Dr. Peiris has conducted research and led R&D projects for the Department of Defense since 1997, when she joined the Naval Research Laboratory, Washington DC soon after her Ph.D. Next at Naval Surface Warfare Center – Indian Head Division, MD, she led a group specializing in high-pressure high-temperature effects and time-resolved spectroscopy of energetic and nano materials. Her work on equations of state and phase diagrams, published in many journals and proceedings, are still referenced today.

In 2008, Dr. Peiris joined the Defense Threat Reduction Agency in Fort Belvoir, VA to execute the then nascent basic research program and lead a portfolio on "Science to Defeat Weapons of Mass Destruction (WMD)". She provided technical expertise and guidance to over 70 research projects on penetration of hard and deeply buried targets; materials for chemical and biological agent defeat; modeling of explosives and reactions of reactive inter-metallic materials, kinetics, turbulence & dispersion; and simulations from quantum mechanics to micro-scale crystals to meso-scale heterogeneous materials to macro-scale weapon payloads, and finally to the continuum weapon effect and lethality.

Dr. Peiris did her BS at University of Michigan, Ann Arbor and completed her PhD at University of Chicago. She has published over 40 peer-reviewed journal articles, several book chapters, and one book titled "Static Compression of Energetic Materials" published by Springer-Verlag in 2006. Her personal favorite quote "if I have seen further, it is by standing on the shoulders of giants" by Sir Isaac Newton, has kept her informed and active in various "materials at extreme" communities. She chaired the International Detonation Symposium in 2006 and 2010, and the American Physical Society's Shock Compression of Condensed Matter (SCCM) conferences in 2015 and 2023. She has been an invited speaker at several Gordon Research Conferences on Energetic Materials and on High Pressure, a plenary speaker at the 2017 SCCM, and keynote speaker at several international conferences. She is a Fellow of the American Physical Society.

TUESDAY (SEPTEMBER 23)

	SESSION 1: **NEW ENGINEERS & ATTENDEES 101** 1:00-3:00PM / UNLIMITED DIST. A CHAIR(S): Shawn Czerniak (Hutchinson) Jade Vande Kamp (Vibration Research)	*SESSION 2:* **AERIAL DELIVERY METHODOLOGIES, TECHNOLOGIES AND SOLUTIONS** 1:00-3:00PM / UNLIMITED DIST. A CHAIR(S): Dr. Daryoush Allaei (QRDC, Inc)	*SESSION 3:* **MUNITIONS FOCUSED MATERIAL TESTING AND MODELING** 1:00-2:35PM / LIMITED DIST. D **DESIGN FOR OVERPRESSURE THREATS** 2:40-3:00PM / LIMITED DIST. D CHAIR(S): Dr. Matthew Neidigk (AFRL) Bruce Patterson (AFRL)
	BORGNE	MAUREPAS	BAYSIDE C
	(##) following each paper title indicates associated page number in the abstract book appendix.		
1:00	**U.S. Navy Equipment Shock Qualification (1)** *Kurt Hartsough (901E&T)*	**Update on Development and Use of RUSB (2)** *Dr. Daryoush Allaei (QRDC, Inc.), Prof. Arezoo Emdadi (Missouri University of Science and Technology)*	**Shell Element Performance in Predicting Projectile Exit Velocity (5)** *Adam Polakowski & Dr. Jarius Bernard (Torch Technologies), Dr. Matthew Neidigk (AFRL)*
1:25	**Shock-Proof: Navigating MIL-DTL-901E Testing (An Explosively Entertaining Intro to MIL-DTL-901E Test Methods) (1)** *Jeff Morris (HI-TEST Laboratories)*	**Update on Development and Use of REAL (3)** *Dr. Daryoush Allaei (QRDC, Inc.), Prof. Arezoo Emdadi (Missouri University of Science and Technology)*	**Development of High Temperature Survivable Electronics Potting (6)** *Dr. Matthew Neidigk (AFRL) & Dalton Gavin (Torch Technologies)*
1:50	**What Is An Isolator? Fundamentals of the Function of an Isolation Mount (1)** *Shawn Czerniak (Hutchinson)*	**Strength Test - Plywood Skid versus Reusable Skid Board (3)** *Brad Womack (Little Rock AFB) & Dr. Daryoush Allaei (QRDC, Inc.)*	**Modeling Polymer-Bonded Explosive Damage in Detonator Geometry (6)** *Dalton Gavin & Dr. Michael Nixon (Torch Technologies), Dr. Matthew Neidigk (AFRL)*
2:15	**Vibration Test Systems in the Lab (1)** *Jade Vande Kamp (Vibration Research Corp)*	**Automatic Airdrop Count Totalizer (AACT) (4)** *Casimir Sienkiewicz (Caztek Engineering), Pete Wolf (Robinson Rubber Co.), & Dr. Daryoush Allaei (QRDC, Inc.)*	**Virtual Arena Test for the 155mm M795 Artillery Shell (6)** *Dr. Jarius Bernard & Brandon Nesbitt (Torch Technologies), Dr. Matthew Neidigk (AFRL)*
2:40	**Sampling & Spectral Analysis: From FFT to SRS (A Practical Overview for Engineers) (2)** *Dr. Ted Diehl (Bodie Technology, Inc.)*	**Redesigning of Combat Expandable Platform (CEP) (5)** *Pete Wolf (Robinson Rubber Co.) & Dr. Daryoush Allaei (QRDC, Inc.)*	**Modernized Bunker Design for Overpressure Threat** *Jalen Johnson & Dr. Robert Browning (Battelle Memorial Institute), David Roman-Castro (AFCEC)*

3:00 - 3:40

ENIDINE

Ice Cream Social

NAPOLEON BALLROOM (EXHIBIT HALL)

	SESSION 4: **DYSMAS I** 1:00-3:00PM / LIMITED DIST. D CHAIR(S): Roger Ilamni (NSWC Indian Head) Caroline Wiley (NSWC Indian Head)	*VENDOR SESSION A:* **EXHIBITOR PRESENTATIONS INCLUDING CASE STUDIES, NEW DEVELOPMENTS, TESTING & PRODUCTS** 1:00-3:00PM / UNLIMITED DIST. A CHAIR(S): Dr. Kyle Gilroy (Vision Research)	*TRAINING I:* **MIL-STD-167 QUALIFICATION AND BEST PRACTICES** 1:00-2:00PM / UNLIMITED DIST. A 
	BAYSIDE A/B	OAK ALLEY	GRAND CHENIER
	(##) following each paper title indicates associated page number in the abstract book appendix.		
1:00	**Response of Buried Surrogate Mine Targets to Seabed UNDEX: 2025 Test Summary (7)** *Roger Ilamni & Dr. Brad Klenow (NSWC Indian Head), Greg Harris (ATR), Swen Metzler & Sven Diedrchsen (WTD-71), Manfred Krüger (iABG)*	**Phantom Cine Analyzer – A Python Based Open-source Platform (8)** *Dr. Kyle Gilroy (Vision Research)*	**MIL-STD-167 Qualification and Best Practices (10)** *Thomas Borawski* *(NSWC Philadelphia)* 1:00-2:00PM
1:25	**Response of Buried Surrogate Mine Targets to Seabed UNDEX: Simulations of Recent Validation Testing (7)** *Brad Klenow & Roger Ilamni (NSWC Indian Head), Manfred Krüger (iABG)*	**What Should a Resonant Plate Shock Test Sound Like? (9)** *Dr. Carl Sisemore (ShockMec Engineering)*	
1:50	**UNDEX Propagation Along Non-Uniform Seabed (8)** *Dr. Joe Ambrico, Dr. Emily Guzas, Ryan Chamberlin, & Eugenia Stanisauskis Weiss (NUWC Newport)*	**Viper::Blast for Advanced Airblast Simulations (9)** *Dr. Peter McDonald (Viper Applied Science)*	
2:15	**Simulating Near-Field UNDEX Against Submerged Concrete Structures (8)** *Dr. Emily Guzas & Ryan E. Chamberlin (NUWC Newport), Dr. Jay Ehrgott & Dr. Joshua Payne (US Army ERDC), Roger Ilamni (NSWC Indian Head)*	**Innovative Approaches to Transient Shock Data Acquisition and Analysis (9)** *Jim Churchill (m+p International)*	
2:40	**EOS Development for Non-Ideal Explosives (8)** *Sujan Bashyal (ATR), Dr. Jeff St. Clair & Dr. Tom Mcgrath (NSWC Indian Head)*	**Experimental characterization of nonlinear stiffness and damping in Taylor Devices' Pumpkin isolators in shear, roll, and angled installations (10)** *Gordon Fox (Taylor Devices)*	

3:00 - 3:40

ENIDINE

Ice Cream Social

NAPOLEON BALLROOM (EXHIBIT HALL)

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TUESDAY (SEPTEMBER 23)

	SESSION 5: **UNDEX** 3:45-4:55PM / UNLIMITED DIST. A CHAIR(S): Dr. Cameron Stewart (NSWC Indian Head) Greg Budriss (NSWC Philadelphia)	*SESSION 6:* **PRACTICAL VIBRATION MODELING** 3:45-5:45PM / UNLIMITED DIST. A CHAIR(S): Dr. Ricky Stanfield (Corvid Technologies) Troy Skousen (Sandia National Labs)	*SESSION 7:* **MUNITIONS FOCUSED MATERIAL TESTING AND MODELING** 3:45-4:55PM / LIMITED DIST. D **STRUCTURAL RESPONSE: ROCKETS** 5:00-5:45PM / LIMITED DIST. D CHAIR(S): Dr. Matthew Neidigk (AFRL) Dr. Jason Foley (AFRL)
	BORGNE	MAUREPAS	BAYSIDE C
3:45	**Recent Improvements in DSTL's Capability for Modeling UNDEX and Associated Structural Response (10)** *Elliot Tam, Mark Whittaker, Dan Pope & Ajen Limbu (DSTL), Arno Klomfass (EMI), Andrew Tyas (Blastech)*	**Virtual shaker testing: simulate and emulate spacecraft responses for notch predictions (12)** *Umberto Musella, Dr. Mattia Dal Borgo, Dr. Silvia Vettori, Dr. Roland Pastorino, Laurane Thielemans, Dr. Emilio Di Lorenzo & Dr. Bart Peeters (Siemens Digital Industries Software)*	**Shock-Specimen for Evaluating Shock Hardening and Anisotropy (15)** *Brandon Nesbitt & Dr. Jairus Bernard (Torch Technologies), Dr. Matthew Neidigk & Christopher Neel (AFRL)*
4:10	**UNDEX, FSI & GPUs: High-Fidelity Blast–Structure Interaction with Viper & OpenRadioss (11)** *Andrew Nicholson, Dr. James Wurster, & Dr. Peter McDonald (Viper Applied Science)*	**Virtual shaker testing by combining system substructures (12)** *Dr. Mattia Dal Borgo, Umberto Musella, Dr. Silvia Vettori, Dr. Alberto Garcia de Miguel, Dr. Emilio Di Lorenzo, & Dr. Bart Peeters (Siemens Digital Industries Software), Thade Kilian Pfluger (University of Trento)*	**Evaluation of the Dynamic Tensile Failure in Pressed Energetic Materials (15)** *Dr. Adrianne Moura, Zach Jowers & Dr. Alain Beliveau (ARA), Dr. Jacob Dodson (AFRL)*
4:35	**The Analysis of Interaction between Bubble and Double-layer Structure with Hole (11)** *Dr. Yuanxiang Sun (Beijing Institute of Technology)*	**Sounding Rocket Flight Vibration NTL Composite Spectrogram (13)** *Dr. Ricky Stanfield (Corvid Technologies)*	**Shock Survivability Testing of Exploding Foil Initiators (15)** *Fahad Abumohaimed (AFRL)*
5:00		**Introduction to Genetic Algorithms for Vibration and Shock Design (14)** *Dr. Charles Hull (Lockheed Martin)*	**Design, Characterization, and Instrumentation of Experimental Tests to Simulate Full-Scale Rocket Environments (16)** *Dr. Jason Foley (presenting); full list of contributors can be found in the Symposium Abstract Book*
5:25		**Limits of Vibration Response in Aircraft: A Challenge to Current Standard in Avionics Vibration Testing (14)** *Marc Heffes (Northrop Grumman)*	**Material Evolution and Damage Phenomenology of Infrastructure Under Direct Rocket Plume Impingement (17)** *Dr. Jason Foley (presenting); full list of contributors can be found in the Symposium Abstract Book*

Thank you for participating at the 95th Shock & Vibration Symposium!

	SESSION 8: **DYSMAS II** 3:45-5:45PM / LIMITED DIST. D+ CHAIR(S): Brian Taylor (AFRL) Otto Quinones (NSWC Indian Head)	*VENDOR SESSION B:* **EXHIBITOR PRESENTATIONS INCLUDING CASE STUDIES, NEW DEVELOPMENTS, TESTING & PRODUCTS** 3:45-5:45PM / UNLIMITED DIST. A CHAIR(S): Lauren Yancey (HI-TEST) Jennifer MacDonell (PCB Piezotronics)	*TRAINING II:* **INTRODUCTION TO UERDTOOLS** 3:45-5:45PM / LIMITED DIST. D 
	BAYSIDE A/B	OAK ALLEY	GRAND CHENIER
3:45	**Extended Holing Rule (17)** *Horacio Nochetto (NSWC Indian Head) & Sujan Bashyal (ATR)*	**Kornucopia's Ability to Synthesize Realistic Oscillatory Transient Shock Including Statistical Considerations (19)** *Dr. Ted Diehl (Bodie Technology, Inc.)*	**Introduction to UERDTools (20)** *Rachel McIntyre* *Brian Lang, & Ari Bard* *(NSWC Carderock)* 3:45 - 5:45pm
4:10	**Parametric study of UNDEX cavity interaction (18)** *James Davis & Dr. Brian Taylor (AFRL/RWTCS)*	**Strengthening Shipbuilding Supply Chains through Supplier Development Funding (19)** *Lauren Yancey (HI-TEST Laboratories)*	
4:35	**Dynamic Effects on Underwater Explosions (18)** *Dr. Brian Taylor (AFRL/RWTCS)*	**Piezoresistive Accelerometers with Amplification and Temperature Compensation (19)** *Jennifer MacDonell (PCB/Endevco)*	
5:00	**JEMTP Water Entry Test Series Summary (18)** *Rachael Busby & Horacio Nochetto (NSWC Indian Head), David Spencer & Andrew Cammenga (NAWC China Lake)*	**Impact Tests According to MIL-883H: A New Shock Exciter (20)** *Michael Mende (SPEKTRA/APS Dynamics)*	
5:25	**DYSMAS M&S of Recent JEMTP Water Entry Test Series (18)** *Horacio Nochetto, Rachael Busby, & Dr. Jeff St. Clair (NSWC Indian Head)*	**Comparison of New Advanced Control and Acquisition Methods to Traditional Vibration Testing for a Single MISO Application (20)** *Stewart Slykhous (Spectral Dynamics)*	

Visit our staff in the Southdown Room with any questions!

TUESDAY
SEPTEMBER 23

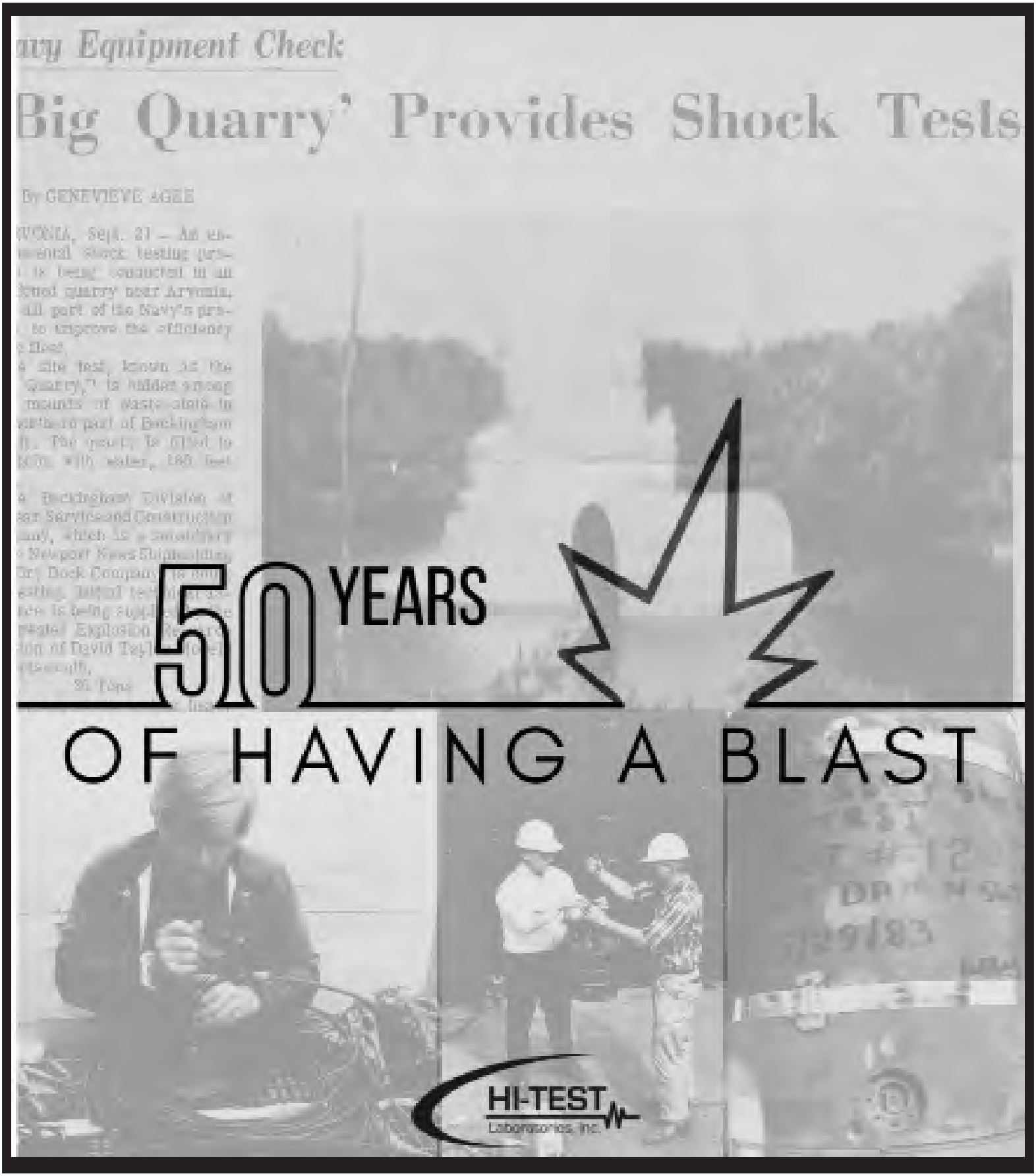
Young Engineer & New Attendee Networking Hour

6:00 - 7:00PM
NAPOLEON BALLROOM (EXHIBIT HALL)

Kick off your conference experience with a special event just for Young engineers and new attendees! Join us for an hour of light refreshments, casual conversation, and meaningful connections.

Whether you're looking to meet peers, ask questions about the conference, or just break the ice on the opening day of sessions... this is the place to be.

Come say hello! We can't wait to meet you!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WEDNESDAY (SEPTEMBER 24)

BREAKFAST WITH THE EXHIBITORS
NAPOLEON BALLROOM | 7:00-8:00AM

	SESSION 9: **SHOCK TESTING & QUALIFICATIONS** 8:00-9:35AM / UNLIMITED DIST. A CHAIR(S): Calvin Milam (Element Defense) Justin Caruana (Cardinal Engineering)	*SESSION 10:* **VIBRATION MODELING** 8:00-8:45AM / UNLIMITED DIST. A **CHARACTERIZATION OF RESPONSE OF ISOLATED SYSTEMS** 8:50-9:35AM / UNLIMITED DIST. A CHAIR(S): Dr. Luke Martin (NSWC Dahlgren) Dr. Peter Vo (Raytheon)	*SESSION 11:* **STRUCTURAL RESPONSE** 8:00-9:35AM / LIMITED DIST. D CHAIR(S): Adam Hapij (Thornton Tomasetti)
	BORGNE	MAUREPAS	BAYSIDE C
8:00	**Remain Safe Shock Qualification of Live Ordnance (21)** *Liam Rayner, Gavin Colliar, Callum Norris, & Brian Ferguson (Thornton Tomasetti)*	**Reduced Order Model of a Gap-Contact Nonlinearity using a Generalized Nonlinear Modal Basis Formulation (22)** *Dr. Deborah Fowler, Dr. Robert J. Kuether, & Dr. Eric Robbins (Sandia National Laboratories)*	**Domino – Automated Prediction of Progressive Structural Collapse from Initial Dynamic Damage (24)** *Duncan McGeehan & Dr. Jeffrey Honig (Protection Engineering Consultants), Dr. Bryan Bewick (Air Force Research Lab)*
8:25	**Determination of Fundamental Deck Frequency to Meet Requirements for MIL-DTL-901E (21)** *Calvin Milam (Element US Space & Defense)*	**Powdered Metal Damping in Cantilever beams (22)** *Cory Puckett, Dr. Eric Schmierer, & Dr. Sandra Zimmerman (Los Alamos National Laboratories)*	**Verification of Modeling Bearings of Unknown Stiffness using connectors and Hertzian Contact During Design Development (24)** *Eddie Gonzalez & Ify Amene (HII Newport News Shipbuilding)*
8:50	**For LWSM Owners: Changes to Shock Test Facility Certification and Inspection Process (21)** *Dan Provenzano (NSWC Philadephia)*	**Inclusion of Simple Optimal Hybrid Dampers into Shock and Vibration Isolation Systems for US Navy shipboard equipment to minimize excursions of, and transmitted accelerations to isolated equipment (23)** *Dr. Christopher Merrill (CM&A Engineering)*	**Development of Metrics for Predicting UNDEX-Induced Collapse of Stiffened Cylinders (25)** *Nick Valm, Dr. Abilash Nair, & Adam Hapij (Thornton Tomasetti), Matt Davis & Chris Joseph (HII-NNS)*
9:15	**How to Fail a Shock Test (21)** *Dan Moran (Maritime Technology Group)*	**Final Selected Design: Shock and Vibration Response of Isolated Rigid Body to US Navy transient shock base excitation and vibration excitation with fixed ratio of CG elevation to horizontal separation of base isolators (23)** *Dr. Christopher Merrill (CM&A Engineering)*	**Non-linear Response History Analysis of Seismic Cradles (25)** *Dr. Eric Hansen & Adam Hapij (Thornton Tomasetti), Harold Carter (General Dynamics Electric Boat)*

9:35 - 10:00

COFFEE BREAK
with the Exhibitors
EXHIBIT HALL / NAPOLEON BALLROOM

BREAKFAST WITH THE EXHIBITORS
NAPOLEON BALLROOM | 7:00-8:00AM

	VENDOR SESSION C: **EXHIBITOR PRESENTATIONS INCLUDING CASE STUDIES, NEW DEVELOPMENTS, TESTING & PRODUCTS** 8:00-9:35AM / UNLIMITED DIST. A CHAIR(S): Bob Metz (PCB Piezotronics)	*TRAINING III:* **MIL-DTL-901E: TEST IT RIGHT THE FIRST TIME** 8:00-9:00AM / UNLIMITED DIST. A 	*TRAINING IV:* **ADVANCED 3D MODELING OF HIGH-FREQUENCY PROBLEMS SEA METHODS** 8:00-9:00AM / UNLIMITED DIST. A 
	OAK ALLEY	BAYSIDE A/B	GRAND CHENIER
8:00	**Shock Performance Comparison of Arch Mounts™ and Industry Standard Wire Rope Mounts (25)** *Andrew Liberatore, Darko Gjoreski, & Richard Rakowski (Shock Tech, Inc.)*	**MIL-DTL-901E: Test it Right the First Time - Avoid Over-Testing & Under-Testing (26)** *Kurt Hartsough (901E&T)* 8:00 - 9:00AM	**Advanced 3D Modeling of High-Frequency Problems Using Statistical Energy Analysis (SEA) Methods (26)** *Sravan Kumar Reddy Mothe (Altair)* 8:00-9:00AM
8:25	**An Electrodynamic Method for MIL-STD-810 Acoustic Testing (25)** *Dale Schick (Acoustic Research Systems), Ed Kinsella(EM Acoustics)*		
8:50	**The Influence of Frequency, Amplitude, and Pre Load During Dynamic Testing of Wire Rope Isolators (25)** *Robert Filec & Ozzie Irowa (Socitec)*		
9:15	**Shock and Vibration Solutions (26)** *Neil Donovan (Hutchinson)*	*Don't forget to nominate presentations for our Henry Pusey Best Paper Award!*	

9:35 - 10:00

COFFEE BREAK
with the Exhibitors
EXHIBIT HALL / NAPOLEON BALLROOM

WEDNESDAY (SEPTEMBER 24)

	SESSION 13: **PYROSHOCK** 10:00-NOON / UNLIMITED DIST. A CHAIR(S): Richard Clayson (AeroVironment)	*SESSION 14:* **VIBRATION TEST METHODS** 10:00-10:45AM / UNLIMITED DIST. A **MIMO VIBRATION** 11:15-NOON / UNLIMITED DIST. A CHAIR(S): Matt Forman (NSWC Dahlgren)	*SESSION 15:* **UNDEX/SHOCK ANALYSIS PROCESS AND APPLICATIONS** 10:00-NOON / LIMITED DIST. D CHAIR(S): Brian Lang (NSWC Carderock) Serena Sauers (NSWC Carderock)
	BORGNE	MAUREPAS	BAYSIDE C
10:00	**Rifle Optics Shock Testing on High-Frequency Resonant Plates (26)** *Dr. Carl Sisemore (ShockMec Engineering)*	**Accelerated Test Development Techniques Using Field Data (28)** *Jade Vande Kamp (Vibration Research Corporation)*	**Transient Shock Analysis Qualification Process (30)** *Rebecca Grisso & Matt Stevens (NSWC Carderock)*
10:25	**Estimation of Impact Duration on a Resonant Plate Using Occupied Bandwidth (27)** *Trevor Turner, William C. Rogers & Dr. Pablo A. Tarazaga (Texas A&M University), Chase Zion & Dr. Washington DeLima (Honeywell Federal Manufacturing & Technologies)*	**Development of combined vibration and shock testing for component flight environments (29)** *David Soine, Dr. Jelena Paripovic-Stevens, & Dr. Ryan Schultz (Sandia National Laboratories)*	**Transient Shock Analysis Qualification Example and Common Errors (30)** *Rebecca Grisso & Matt Stevens (NSWC Carderock)*
10:50	**Mechanical Impact Pyroshock Simulator: An Investigation of Dual Cannon Performance (27)** *Claudia Northrup (Element US Space & Defense)*		**Design and Simulation of a Naval Radar System to Pass MIL-STD-901E Heavyweight Shock Testing Through Implementation of a Lightweight Precision Centered Isolation System (31)** *Brandon Flood, Ryan Gaylo, Stewart Skiles, Jeffrey McMichael, & Nathan Compton (Georgia Tech Research Institute)*
11:15	**Resonant Plate Anvil Design and The Affect on the Shock Pulse Energy Content (27)** *Dr. Carl Sisemore (ShockMec Engineering)*	**Methods to Envelope Multiple Random Vibration Environments into a Single MIMO Environment (29)** *Randy Mayes (Sandia National Laboratories)*	**Phalanx Shipboard Equipment Grade B Shock Qualification (31)** *Helen Huang, Jim Landry, Fred Folch-Pi, & Wen-Te Wu (Raytheon - RTX)*
11:40	**Shock Response Spectrum (SRS) Validation Using Discrete Dynamic Analytical Methods (28)** *Darko Gjoreski, Shane Jansen, & Richard Rakowski (Shock Tech, Inc)*	**Mission synthesis formulation for multi-axial durability testing (30)** *Dr. Alberto Garcia de Miguel, Umberto Musella, Ruben Araujo, Dr. Mattia Dal Borgo, & Dr. Emilio Di Lorenzo (Siemens Digital Industries Software)*	**Influence of Boundary Conditions on Underwater Explosions - Examples Tying Theory to Test Data (32)** *Mr. Brian Lang (NSWC Carderock)*

tip

DON'T FORGET TO VISIT THE EXHIBIT HALL AND COMPLETE YOUR "PASSPORT" FOR A CHANCE TO WIN GIFT CARDS, GADGETS, & MORE!

	SESSION 16: **STRUCTURAL RESPONSE: WEAPONS EFFECTS** 10:00-NOON / LIMITED DIST. D CHAIR(S): Roosevelt Davis (AFRL) Ernest Staubs (AFRL)	*VENDOR SESSION D:* **EXHIBITOR PRESENTATIONS INCLUDING CASE STUDIES, NEW DEVELOPMENTS, TESTING & PRODUCTS** 10:00-11:10AM / UNLIMITED DIST. A CHAIR(S): Bob Metz (PCB Piezotronics)	*WORKING GROUP:* **MIL-DTL-901 WORKING GROUP** 10:00-NOON / UNLIMITED DIST. A 
	BAYSIDE A/B	OAK ALLEY	GRAND CHENIER
10:00	**Evaluation of Analytical Equations for Fragment Effects to Targets (32)** *David Lichlyter, Dr. T. Neil Williams, & Mr. Christopher M. Shackelford (US Army Corps of Engineers ERDC)*	**Stainless Steel High Damping Wire Rope Isolators (34)** *Tyler Feingold & Alex Jason (VMC Group)*	**MIL-DTL-901E Working Group** *The working group will consist of a series of preselected discussion topics in common areas of concern (e.g. fastener tightening, mass ratios, SRF calculation, etc.) and then an open floor for Q&A.* Moderators: *Thomas Brodrick, NAVSEA 05P1* *Ryan Shorts, NSWC Carderock* *Kervin Michaud, NSWC Philadelphia* 10:00 - NOON
10:25	**Fragmentation of a Facade Structure at Full-Scale Using the Large Blast/ Thermal Simulator (32)** *Sheera Lum, Joe Crepeau, Jakob Brisby, Mohsen Sanai, Damian Cano, Waylon Weber, & Sean P. Cooper (Applied Research Associates)*	**Integrating Physics-Based Modeling and AI for Scalable, Real-Time Digital Twin Solutions (35)** *Ray Deldin (Altair Engineering)*	
10:50	**Investigating the Effects of Breach Area Representation on Internal Blast Pressure Predictions (33)** *Christopher Shackelford, Dr. T. Neil Williams & John Q. Ehrgott, Jr. (US Army Corps of Engineers ERDC)*	**MIL-DTL-901E Discussion (35)** *Kurt Hartsough (901E&T)*	
11:15	**Analysis of Penetrator Failure Modes with Hybrid Finite Element Model (33)** *Logan Rice, Dr. Mark Adley, David Lichlyter, & Ernesto G. Cruz (US Army Corps of Engineers ERDC)*		
11:40	**Advanced Concrete Reinforcement Modeling with Second-Order Finite Elements Using Explicit Methods (34)** *Dr. Kent T Danielson & William Furr (US Army Corps of Engineers ERDC)*		

SEE A PRESENTATION WORTHY OF OUR HENRY C. PUSEY AWARD?
REMEMBER TO NOMINATE THAT PAPER USING THE PROVIDED QR CODE!

WEDNESDAY
SEPTEMBER 24

AWARDS LUNCHEON (GENERAL SESSION II) NOON - 1:30PM

NAPOLEON BALLROOM

NOON—12:05PM	**CALL TO ORDER**	
	Mr. Drew Perkins (SAVE / HI-TEST Laboratories)	
12:05PM—12:15PM	**HENRY PUSEY BEST PAPER AWARD**	
	PRESENTED TO:	Dr. Ricky Stanfield (Corvid Technologies)
12:15PM—12:20PM	**AWARD FOR EXCELLENCE IN INSTRUCTION AWARD**	
	PRESENTED TO:	Denis Rickman (USACE ERDC)
12:20PM—12:40PM	**LIFETIME ACHIEVEMENT AWARD**	
	PRESENTED TO:	Douglas Firth (Precision Filters)
	PRESENTED TO:	Dr. Kent Danielson (USACE ERDC)

Henry Pusey Best Paper Award

PRESENTED TO:

"Sounding Rocket Flight Vibration versus Reynold's and Strouhal Numbers"
Dr. Ricky Stanfield (Corvid Technologies)

The flight vibration environment for sounding rocket class vehicles has been characterized using several approaches through the years. From the mid 1970's to early 2000's, the environments were based on NASA hand-calculated power spectral density data on a limited set of flight vibration measurements. Between 2002 to 2019, work was performed over a much wider set of data to trend flight vibration environments against common flight analysis parameters such as flight dynamic pressure and Reynold's number. More recently, an exploration was started with several new sounding rockets data sets to determine the extent to which the vector components of flow velocity across the diameter of the rocket generate certain spectral features. This crossflow is caused by small airframe flight path angles of attack relative to the vehicle velocity vector and it contributes to vibration features that do not otherwise follow the larger trend with Reynold's number. In this paper, we discuss the empirical correlation between flight vibration magnitude and spectral content to Reynold's Number and Dynamic Pressure; the correlation of some vibration features with airframe angle of attack, crossflow velocity, and Strouhal number; and how other interactions between structural frequencies and aerodynamically driven vortex shedding frequencies generate transient vibratory features.

Award for Excellence in Instruction

PRESENTED TO:

Denis Rickman (US Army Corps of Engineers Engineering Research & Development Center)
for his tutorial "Air Blast and Cratering: An Introduction to the ABC's of Explosion Effects in Air and on Land"

This three-hour course introduces the effects of explosions in air and on land. Topics covered include airblast, soil/rock/pavement cratering, and ground shock phenomena produced by explosive detonations. There is a little math, but for the most part, the focus is on aspects and principles that are of practical use to those conducting (and utilizing) blast-related research. Most researchers in the blast arena have some grasp of explosion effects fundamentals, but very few have a good, broad-based understanding of how it all works. The goal is to provide the participants with enough of an understanding that they can appreciate the various explosion phenomena and those parameters that affect blast propagation and blast loading of objects in a terrestrial setting.

AWARDS LUNCHEON
(GENERAL SESSION II)
NOON - 1:30PM

Douglas Firth

2025 LIFETIME ACHIEVEMENT AWARD WINNER

Lifetime Achievement Award

PRESENTED TO:
Mr. Douglas Firth
Precision Filters

Doug Firth has dedicated nearly 40 years of his working life to significantly improving the state of the art and practice for the most demanding test and measurement applications. He has made written and oral presentations to teach techniques and to introduce technology that improved measurement accuracy, repeatability, and efficiency. His most significant contribution has been to convert these techniques and technology into user-friendly signal conditioning products which converted these ideas into a concrete reality for thousands of engineers and technicians.

Dr. Kent Danielson

2025 LIFETIME ACHIEVEMENT AWARD WINNER

Lifetime Achievement Award

PRESENTED TO:
Dr. Kent T. Danielson
U.S. Army Engineer Research and Development Center (ERDC)

Dr. Kent Danielson has made significant contributions to the field of shock and vibration, specifically in the area of computational mechanics, through his work with higher order elements for use in explicit solid dynamics and his development of nonlinear constitutive models for geomaterials under extreme loading.

Congratulations to our Award Winners!

WEDNESDAY (SEPTEMBER 24)

	SESSION 17: **SHOCK & VIBRATION MOUNT DESIGN & ANALYSIS** 1:30-1:50PM / LIMITED DIST. D 1:55-3:05PM / UNLIMITED DIST. A CHAIR(S): Alan Klembczyk (Taylor Devices) Shawn Czerniak (Hutchinson)	*SESSION 18:* **INSTRUMENTATION DATA ANALYSIS** 1:30-3:05PM / UNLIMITED DIST. A CHAIR(S): Dr. Ted Diehl (Bodie Technology)	*SESSION 19:* **MECHANICAL SHOCK & VIBRATION TEST METHODS AND EVALUATION** 1:30-3:05PM / UNLIMITED DIST. A CHAIR(S): Chris Sensor (Siemens)
	BORGNE	MAUREPAS	BAYSIDE C
1:30	**Analysis of Snubbed Mount Dynamics (35)** *Jordan Poehler & Matt Stevens (NSWC Carderock*	**A New Perspective on Structural Response in Shaker Testing (37)** *Sean Hollands (RDI Technologies)*	**Advancing System and Subsystem Shock Experimental Capabilities with Rebounding Sled for Velocity Shocks (39)** *Joshua Nowlin, Dr. Nancy Winfree, & Adam Slavin (Sandia National Labs)*
1:55	**Highly Damped Shipboard Shock Mounts: A Review of Design Parameters & Analytical Predictions (Part 1) (36)** *Shawn Czerniak & Grete Bressner (Hutchinson Aerospace & Industry)*	**Understanding and Preventing Shock Waveform Distortion Caused by Measurement System Limitations (37)** *Dr. Thomas Gerber, Alan Szary, & Douglas Firth (Precision Filters, Inc.)*	**Five Methods to Create a Single-Axis Shock Environment from a Multi-Axis Shock Response (40)** *Dr. Brian Evan Saunders, Dr. Vit Babuska, & Douglas Coombs (Sandia National Laboratories)*
2:20	**Highly Damped Shipboard Shock Mounts: A Review of Test Validation on Elastomer Samples & Full-Scale Mounts (Part 2) (36)** *Grete Bressner & Shawn Czerniak (Hutchinson Aerospace & Industry)*	**Improving FFT-based Filtering of Transient Shock Data by Plausibly Honoring the Periodicity Requirement (38)** *Dr. Ted Diehl (Bodie Technology)*	**Energy based severity comparison of multi-DOF transient environments (41)** *Dr. Mattia Dal Borgo, Dr. Alberto Garcia de Miguel, Umberto Musella, Dr. Emilio di Lorenzo (Siemens Digital Industries Software), Roberto Fagioli (Politecnico di Milano)*
2:45	**Comparison of experimental characterization of nonlinear stiffness and damping between wire rope isolators and Taylor Devices' Pumpkin isolators in shear, roll, and angled installations (36)** *Gordon Fox (Taylor Devices)*	**Improving High-G Shock Measurements: A Practical Case Study for Physical Testing and/or Numerical Simulation (38)** *Dr. Ted Diehl (Bodie Technology)*	**Integrating Dynamic Design Analysis Methods (DDAM) with Operational Simulations for Shipboard Performance Optimization (41)** *Kory Soukup (Altair Engineering)*

3:05 - 3:40

Ice Cream Break & Passport Program Drawing

NAPOLEON BALLROOM/EXHIBIT HALL

SPECTRAL DYNAMICS

SOCITEC

Join us for a sweet afternoon treat and the announcement of prize winners for the Passport Program.

This is also the last opportunity to visit with our exhibitors!

Participants do not need to be present to win.

	SESSION 20: **NAVY ENHANCED SIERRA MECHANICS (NESM)** 1:30-3:05PM / LIMITED DIST. D CHAIR(S): Dr. Nicholas Reynolds (NSWC Carderock)	*TRAINING V:* **PHANTOM CINE ANALYZER** 1:30-2:30PM / UNLIMITED DIST. A	*TRAINING VI:* **INTRODUCTION TO HEAVYWEIGHT SHOCK TESTING** 1:30-3:00PM / UNLIMITED DIST. A
	BAYSIDE A/B	OAK ALLEY	GRAND CHENIER
1:30	**Perks and Pitfalls of Band Damping (42)** *Dr. Nicholas Reynolds (NSWC Carderock)*	**Phantom Cine Analyzer – A Python Based Open-source Platform for Advanced Image-based Motion Analysis (42)** *Dr. Kyle Gilroy* *(Vision Research)* 1:30 - 2:30PM	**Introduction to Heavyweight Shock Testing (43)** *Travis Kerr* *(HI-TEST Laboratories)* 1:30 - 3:00PM
1:55	**Effect of Shell t/L Ratios on Structural Response in Sierra/SM (42)** *Keenan Powers, Ari Bard, Rohan Bardhan, Michael Miraglia, & Dr. Nicholas Reynolds (NSWC Carderock)*		
2:20	**GPU Enabled Speedups for Modal Analyses in Sierra/SD (42)** *Rohan Bardhan, Ari Bard, Michael Miraglia, Keenan Powers, & Dr. Nicholas Reynolds (NSWC Carderock)*		
2:45	**Navy Enhanced Sierra Mechanics (NESM) Dynamic Design Analysis Method (DDAM) Study (42)** *Ian Larson (NSWC Carderock)*		

3:05 - 3:40

Ice Cream Break & Passport Program Drawing

NAPOLEON BALLROOM/EXHIBIT HALL

SPECTRAL DYNAMICS

SOCITEC

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WEDNESDAY
SEPTEMBER 24

TUTORIAL SESSION VII
3:30 - 6:30PM

OPTIONAL THREE HOUR COURSES. ATTENDEES WILL RECEIVE A CERTIFICATE OF COMPLETION AND MAY RECEIVE CEUs/PDHs (VARIES BY STATE). ADDITIONAL FEES APPLY TO ATTEND.

SHOCK TEST FAILURE MODES

BAYSIDE A/B

Kurt Hartsough (901 E&T)

This tutorial will cover examples of shock test failures typically experienced by equipment exposed to MIL-DTL-901E shock levels. MIL-DTL-901E provides guidance for designers responsible for meeting the requirements of MIL-DTL-901E. This tutorial will show how and why equipment failures occur and show how minor design changes can prevent shock failures. Hands on demonstrations, real time high speed video and analysis will be used to demonstrate both failures and corrective actions.

QUANTITATIVE METHODS FOR SURVIVABLE ELECTRONICS PACKAGING FOR COMBINED LOADING OF THERMAL AND HIGH AMPLITUDE MECHANICAL SHOCK

OAK ALLEY

NOTE: LIMITED DISTRIBUTION D (SECURITY PAPERWORK REQUIRED)

Dr. Matthew Neidigk (AFRL)
Zachary Jowers (Applied Research Associates)

Fuze electronics intended for hard target defeat must survive both MIL-STD thermal cycle environments and extreme mechanical shock. Fuzes are often potted to prevent printed circuit board (PCB) flexure associated with component failure during impact. Potting techniques, or packaging strategies, may vary significantly by vendor and are often developed through trial and error. In many cases they are proprietary. Some packaging strategies include the application of elastomeric coatings to PCBs and components, or the use of epoxy underfills beneath components. Because most packaging materials are polymers, the disparity in thermal expansion between them and other fuze materials leads to a whole new series of problems during thermal cycling. As such, the DoD and the DOE have devoted considerable effort in the areas of material characterization, model development, and experimental validation, all with the goal of identifying survivable packaging strategies for use in both conventional and nuclear weapon stockpiles. Upon completion of this course, the user should have a basic understanding of the properties of common packaging materials, modeling and simulation tips and tricks, and latest developments in the design and evaluation of survivable packaging strategies for high-g electronics.

MISSION SYNTHESIS FROM FIELD DATA TO SHAKER REFERENCE PROFILES

BORGNE

Umberto Musella (Siemens)
Alberto Garcia De Miguel (Siemens)

Vibration control tests are performed to verify that an aerospace system and all its sub-components can withstand the vibration environment during the operational life. These tests aim to accurately replicate the in-service environment that a Device Under Test (DUT) will experience in-service via controlled shaker excitation. For aerospace systems and subsystems, random and/or sine vibration tests are required for all the main mechanical and electrical components. These types of tests are performed to replicate in the laboratory the response of the DUT to the broadband random inputs (e.g. transportation or in-flight environments) or responses to sweeping tonal phenomena. Many manufacturers rely upon ASTM, IEEE, MIL or ISO standard to define the vibration profiles. These profiles are typically the results of enveloping a very large set of possible in-service events and also include conservative safety margins. Some events used for standard profiles may not be representative for a specific DUT and yet drive the design leading to potentially unacceptable and costly overdesign. More dangerously, events that may be critical for a specific DUT may not be well-captured by the legacy standardized profiles. This could lead to product field failures, consumer dissatisfaction and warranty/recall costs. In this tutorial we describe a robust methodology to derive shaker test specification directly from field data.

INTRODUCTION TO WEAPONS EFFECTS AND SHIP COMBAT SURVIVABILITY ANALYSIS
Jan Czaban (Zenginworks Limited)

GRAND CHENIER

This short course provides a practical understanding of naval ship combat survivability and methods to assess the effects of various weapons. The introduction will review terminology, concepts and current practice involved in setting, achieving and verifying survivability requirements. Naval threats and weapon types will be reviewed and methods for predicting their resultant loads and damage mechanisms explained. Primary weapons effects will include attacks from underwater explosions, above water explosions, internal blast, fragments and ballistic projectiles. Sample problems will be provided to demonstrate how to estimate the extent of damage sustained by ship structures and how to apply and interpret damage using standard terms of capability degradation. Methods for hardening ship systems and structures will be reviewed with an introduction provided to explain dynamic load effects tolerance, armour systems and simplified pass/fail global design assessment techniques. The course material will be entirely based on public domain sources and includes a comprehensive list of references and applicable military standards.

MIL-DTL-901E ENGINEERING TOPICS
Domenic Urzillo (NSWC Carderock)

BAYSIDE C

MIL-DTL-901E Engineering topics is a follow-on course to the MIL-DTL-901E Test and Extension training courses and is aimed at providing the NAVSEA acquisition and engineering communities with a more in-depth review of engineering mathematics routinely used in equipment shock qualification. Topics covered include shock spectrum as it relates to MIL-DTL-901E testing, digital data filtering, shock response frequency, shock test fixture design fundamentals and FSP deck simulation fixtures.

THE NATIONAL WWII MUSEUM
NEW ORLEANS

WEDNESDAY NIGHT SOCIAL

7:30 - 9:30PM

ALL SYMPOSIUM ATTENDEES AND GUESTS ARE WELCOME.

DINNER & DRINKS PROVIDED TO ALL SAVE ATTENDEES AND GUESTS.

BRING YOUR CONFERENCE BADGE FOR ENTRY.

ALL FOOD, DRINKS, AND ACTIVITIES ARE SPONSORED IN FULL BY OUR COMMERCIAL SPONSOR.

TRANSPORTATION NOT PROVIDED. .7 MILE WALK | 5 MINUTE UBER
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945 MAGAZINE STREET | NEW ORLEANS, LA 70130

HI-TEST Laboratories, Inc.

THURSDAY (SEPTEMBER 25)

ATTENDEE BREAKFAST
NAPOLEON BALLROOM | 7:00-8:00AM

	SESSION 21: **SHOCK AND VIBRATION ISOLATION** 8:00-9:10AM / UNLIMITED DIST. A CHAIR(S): Mackenzie Wilson (HII-NNS)	*SESSION 22:* **BLAST DAMAGE** 8:00-9:10AM / UNLIMITED DIST. A **BALLISTICS** 9:15-10:00AM / UNLIMITED DIST. A CHAIR(S): William Furr (USACE ERDC) Gabriel Riveros (USACE ERDC)	*SESSION 23:* **MECHANICAL SHOCK AND VIBRATION TEST APPLICATIONS** 8:00-8:20AM / LIMITED DIST. D 8:25-9:10AM / UNLIMITED DIST. A **ELECTRONICS SURVIVABILITY** 9:15-9:35AM / UNLIMITED DIST. A 9:40-10:00AM / LIMITED DIST. D CHAIR(S): Troy Skousen (Sandia National Labs)
	BORGNE	MAUREPAS	BAYSIDE A/B
8:00	~~**Shock Performance Comparison of Arch Mounts™ and Industry Standard Wire Rope Mounts (43)**~~ ~~*Andrew Liberatore, Darko Gjoreski, & Richard Rakowski (Shock Tech, Inc.)*~~ ***CANCELLED***	**Damage Effects of Surface Charges on Massive Concrete Mixture Specimens (45)** *Gabriel Riveros (US Army Corps of Engineers ERDC)*	**Shipboard Equipment Vibration Mitigation with Semi-Active Control of Smart Dampers (48)** *Maxim Veilleux, Dr. Richard Christenson & Dr. Jiong Tang (University of Connecticut)*
8:25	~~**Improving Modeling of Height-Dependent Lateral Performance of Wire Rope Isolators for Enhanced Simulation of Shock and Vibration Systems (43)**~~ ~~*Joshua Partyka (Isolation Dynamics Corporation)*~~ ***CANCELLED***	**Use of LIDAR Point Clouds and Finite Element Modeling to Assess Residual Capacity of Blast-Damaged Infrastructure (45)** *Cadet Samuel Benson, Cadet Samuel Keys, & Prof. Eric Williamson (United States Military Academy)*	**Shock and Vibration Properties of Additively Manufactured Stainless Steel (48)** *Troy Pacheco, Dr. Sandra Zimmerman, & Ryan Hemphill (Los Alamos National Laboratory)*
8:50	**Design and Qualification of a Passive Dynamic Vibration Absorber for Ariane 6 Using Wire Rope Isolators (44)** *Jean-Pierre Tartary & Osadolo Irowa (Socitec US)*	**Higher-Order Beam Elements for Explicit Methods in Nonlinear Dynamics (46)** *William Furr, Atharva Kulkarni, Dr. J.N. Reddy, Dr. Arun Srinivasa, & Dr. Kent T. Danielson (US Army Corps of Engineers ERDC)*	**Shock Induced Cavitation in a Hydraulic Cylinder (49)** *Dr. Jon Yagla (Dynamics, Thermodynamics, and Ballistics LLC)*
9:15		**Gun Barrel Beam Vibrations and Accuracy (46)** *Dr. Jon Yagla (Dynamics, Thermodynamics, and Ballistics LLC)*	**Thermal Vulnerability of Potted Surface Mount Resistors and What to Do About It (49)** *Dr. Joel Limmer (Sandia National Laboratories)*
9:40		**Gun Barrel Dynamics via High Speed Motion Amplification (47)** *Sean Hollands (RDI Technologies)*	**Electronics Fixturing for Microbead Potting as Shock Mitigation (50)** *Natasha Wilson & Cayden Boll (Sandia National Laboratories)* *LIMITED DIST. D. THIS IS A CHANGE.*

ATTENDEE BREAKFAST
NAPOLEON BALLROOM | 7:00-8:00AM

	SESSION 24: **MECHANICAL SHOCK TESTING AND ANALYSIS** 8:00-10:00AM / LIMITED DIST. D CHAIR(S): Ryan Powers (NSWC Philadelphia) Kaitlyn Riggs (NSWC Philadelphia)	*SESSION 25/PANEL:* **COMPARISON OF SHIPBOARD QUALIFICATION STANDARDS** 8:00-10:00AM / LIMITED DIST. D+ (ACCESS CONTROLLED BY PRESENTERS)	*TRAINING VII:* **INTRODUCTION TO LIGHTWEIGHT SHOCK TESTING** 8:00-9:00AM / UNLIMITED DIST. A **INTRODUCTION TO MEDIUM WEIGHT SHOCK TESTING** 9:00-10:00AM / UNLIMITED DIST. A
	BAYSIDE C	OAK ALLEY	GRAND CHENIER
8:00	**Applications for Printed Hybrid Electronic (PHE) Assemblies Subject to Extreme Mechanical Shock at Multiple Temperatures (51)** *Maj. Hayden Richards & Dr. Abhijit Dasgupta (University of Maryland), Andres Bujanda, Matthew Bowman, & Dr. Harvey Tsang (DEVCOM Army Research Lab*	**Comparison of Shipboard Qualification Standards** *The session will consist of a series of presentations introducing the topic prior to a panel-moderated open discussion .* Presenters/Moderators: *Nick Misselbrook (Thornton Tomasetti)* *Helen Peterson (UK Sub.Delivery Agency)* *Brian Lang (NSWC Carderock)* *Additional Members TBD* 8:00-10:00AM	**Introduction to Lightweight Shock Testing (52)** *Jeff Morris* *(HI-TEST Laboratories)* 8:00-9:00AM
8:25	**Attenuation in Resonant Fixture Shock Tests with a Transmissibility-Informed Case Study (51)** *Brian Saunders, Dr. Vit Babuska, & Gabrielle Graves (Sandia National Laboratories)*		
8:50	**Comparative Shock Testing of Conventional and Head-Weak Fasteners: Background, Test Planning, and Execution (52)** *LeeYung Chang, John-David Houchins, Joshua Yates, Ian Larson, & Jacob Mason (NSWC Carderock)* *TIME CHANGE/SWAP*		**Introduction to Medium Weight Shock Testing (52)** *Jeff Morris* *(HI-TEST Laboratories)* 9:00-10:00AM
9:15	**Comparative Shock Testing of Conventional and Head-Weak Fasteners: Results Analysis (52)** *Andrew Cunningham, John-David Houchins, LeeYung Chang, Ian Larson, & Jacob Mason (NSWC Carderock)* *TIME CHANGE/SWAP*		
9:40	**Shock Qualification of Additively Manufactured Metal Parts for US Navy Applications (52)** *Jacob Mason (NSWC Carderock)*		

THURSDAY (SEPTEMBER 25)

	SESSION 26: **SHOCK & VIBRATION MODELING & SIMULATION** 10:00-11:35AM / UNLIMITED DIST. A CHAIR(S): Justin Caruana (Cardinal Engineering)	*SESSION 27:* **INSTRUMENTATION APPLICATION** 10:00-10:45AM / UNLIMITED DIST. A 10:50-11:10AM / LIMITED DIST. D 11:15-11:35AM / UNLIMITED DIST. A CHAIR(S): James Nelson (PCB Piezotronics) Lauren Yancey (HI-TEST Laboratories)	*SESSION 28:* **NOVEL UNDEX & MECHANICAL SHOCK INVESTIGATIONS** 10:00-11:10AM / LIMITED DIST. D **VULNERABILITY ASSESSMENTS** 11:15-NOON / LIMITED DIST. D CHAIR(S): Austin Glenwright (NSWC Philadelphia) Jacob Mason (NSWC Carderock)
	BORGNE	MAUREPAS	BAYSIDE A/B
10:00	**Design Exploration for Shock-Resistant Shipbuilding (53)** *Kory Soukup (Altair Engineering)*	**Cryogenic Performance of High-G Damped Accelerometers: Further Testing (54)** *James Nelson (PCB Piezotronics)*	**Modeling and Simulation of Bursting Pressure Vessels due to Thermal Runaway Events of Internal Lithium-Ion Batteries (56)** *Ben Medina (NSWC Carderock)*
10:25	**Accelerating Shock-Qualified Casting Design in Shipbuilding with AI-Based Reduced-Order Models (53)** *Giri Prasanna (Altair Engineering)*	**Securing Accelerometers Under Extreme Conditions: A Review of Adhesives and Installation Practices (55)** *Samuel Stone (Lawrence Livermore National Laboratory)*	**Enhanced Testing Guided by Modeling and Simulation Overview (56)** *Timothy McGee, Jacob Mason, Matthew Stevens, & Rachel McIntyre (NSWC Carderock)*
10:50	**Modernizing the Exodus Profile for Streamlined Shipboard Shock Analysis (53)** *Jason Krist (Altair Engineering)*	**Data Recorder Survivability in High Shock Environments (55)** *Victor Nevarez (Sandia National Laboratories)* *LIMITED DIST. D. THIS IS A CHANGE.*	**Underwater Explosion Performance Characterization (56)** *Noah Moffeit, Dr. Brian Taylor, Daniel Vu, & Samuel Schemmer (AFRL), Kent Rye & Brian Mills (NSWC Carderock), Dominic Farole (US Army)*
11:15	**Evaluation of Transportation Shock and Testing for Failure and Damage (54)** *Dr. Arup Maji (Sandia National Laboratories)*	**Optical Measurement Techniques for Dynamic Characterization of a DUT During Vibration and Acoustic Testing (55)** *Bart Peeters, Alberto Garcia De Miguel, Umberto Musella, Davide Mastrodicasa, Dr. Emilio Di Lorenzo, Simone Manzato, & Francesco Cosco (Siemens)*	**Reduced Order Modelling for Damage Assessment (57)** *Dr. Juan Londono, Caleb Penner, Andrew Shakalis, & Samantha Wu (Thornton Tomasetti), Trevor Conklin, Sadie Johnson, Greta Ouimette, & Benjamin Adam (NSWC Carderock)*
11:40	*Thank you for participating at our 95th Shock & Vibration Symposium!*		**An Improved Assessment Framework for Submarine Environments (57)** *Greg Gorman & Chris Craig (Thornton Tomasetti), Rebecca Dickey, James Mills, Jonathan Lee, & Christopher Bradel (NSWC Carderock)*

1:00 - 2:00

SAVE TECHNICAL ADVISORY GROUP (TAG) MEETING — BORGNE

The annual meeting of the members of the SAVE Technical Advisory Group (TAG) will convene to review the 95th Shock & Vibration Symposium and discuss plans for 2026.

	SESSION 29: **GROUND SHOCK, BLAST EFFECTS, & PENETRATION** 10:00-NOON / LIMITED DIST. D CHAIR(S): Christopher Shackelford (USACE ERDC) David Lichlyter (USACE ERDC)	*DISCUSSION GROUP:* **DYNAMIC ENVIRONMENTS QUALIFICATION WORKING GROUP** 10:00-NOON / UNLIMITED DIST. A	*TRAINING VIII:* **SHOCK RESPONSE SPECTRUM PRIMER** 10:00-11:30AM / UNLIMITED DIST. A
	BAYSIDE C	OAK ALLEY	GRAND CHENIER
10:00	**Applications of Second-Order Finite Element Analysis for Groundshock (57)** *N. Ivan Arnold, Dr. Kent Danielson, & Photios Papados (US Army ERDC)*	**Dynamic Environments Qualification Working Group** *Troy Skousen & David Soine (Sandia National Laboratories)* 10:00AM - NOON *The goal of dynamic environments qualification is to demonstrate that designs can withstand vibration inducing in-service loads while performing as required. Qualification evidence is often collected through laboratory testing intended to mimic field environment conditions with some conservatism. The objective of the Dynamic Environments Qualification Working Group is to shepherd the advancement of ideas and methods for shock and vibration environments qualification through test and analysis in the Shock & Vibration Symposium community. It is a forum to bring together the people that will lead the community to advance the state of the art in dynamic environments qualification. Collaborative discussion will include:* *• Discuss and evaluate effectiveness of sessions, tutorials, trainings, and discussion groups held at the symposium this year.* *• Identify thoughts, traditions, and standard practices that may be holding us back.* *• Sharing thoughts on the research needed to advance the state of the art.* *• What actions should the working group take within and external to the Shock and Vibration Symposium?*	**Shock Response Spectrum Primer (59)** *Dr. Carl Sisemore (ShockMec Engineering)* 10:00 - 11:30AM
10:25	**Enhanced Standoff Obstacle Breaching using Slurry Line Charge Explosive (58)** *Stephen Turner, George Vankirk, Dr. John Q. Ehrgott, Jr., Denis Rickman, & Dr. Darren Rice (US Army ERDC), Ernest Moore, Cole Becker, & Amy Wilson (DEVCOM AC)*		
10:50	**Characterization of Simplified Surrogate Munition (58)** *Marcus Barksdale, Austin Hopkins, & Bowen Woodson (US Army ERDC)*		
11:15	**Holmquist Johnson Cook Constitutive Model Material Constants Fitting to Deceleration and Velocity Test Data (59)** *Miroslav Tesla, Donald Carlucci, & Eric Marshall (US Army DEVCOM Armaments Center)*		
11:40	**Enhancing Bending-Damage Predictions for Thin-walled Structures in NESM** *Juan G. Londono, Pawel Woelke, Caleb Penner, & Greg Gorman (Thornton Tomasetti), Michael Miraglia (NSWC Carderock)*		

1:00 - 2:00

SAVE TECHNICAL ADVISORY GROUP (TAG) MEETING

BORGNE

The annual meeting of the members of the SAVE Technical Advisory Group (TAG) will convene to review the 95th Shock & Vibration Symposium and discuss plans for 2026.

Exhibitor List

100 BOEING - LMTF
101 JOHN EVANS' SON
102 IX CAMERAS
103 THE VMC GROUP
104 TIRA GMBH

201 PCB PIEZOTRONICS
202 PCB PIEZOTRONICS
203 E-LABS
204 TAYLOR DEVICES
205 901E&T
206 SOCITEC
207 DEWESOFT
208 HBK
209 SPECTRAL DYNAMICS
210 RDI TECHNOLOGIES
211 PHOTRON
212 CORRELATED SOLUTIONS

301 BODIE TECHNOLOGY
302 KISTLER INSTRUMENT CORP
303 PRECISION FILTERS
304 SHOCK TECH
305 SHOCK TECH
306 HI-TECHNIQUES
307 M+P INTERNATIONAL
308 CRYSTAL INSTRUMENTS
309 ELEMENT US SPACE & DEF.
310 DATA PHYSICS/TEAM CORP.
311 ACOUSTIC RESEARCH SYS.
312 SPEKTRA

401 VIBRATION RESEARCH
402 VIPER APPLIED SCIENCE
403 DAYTON T. BROWN
404 ALTAIR
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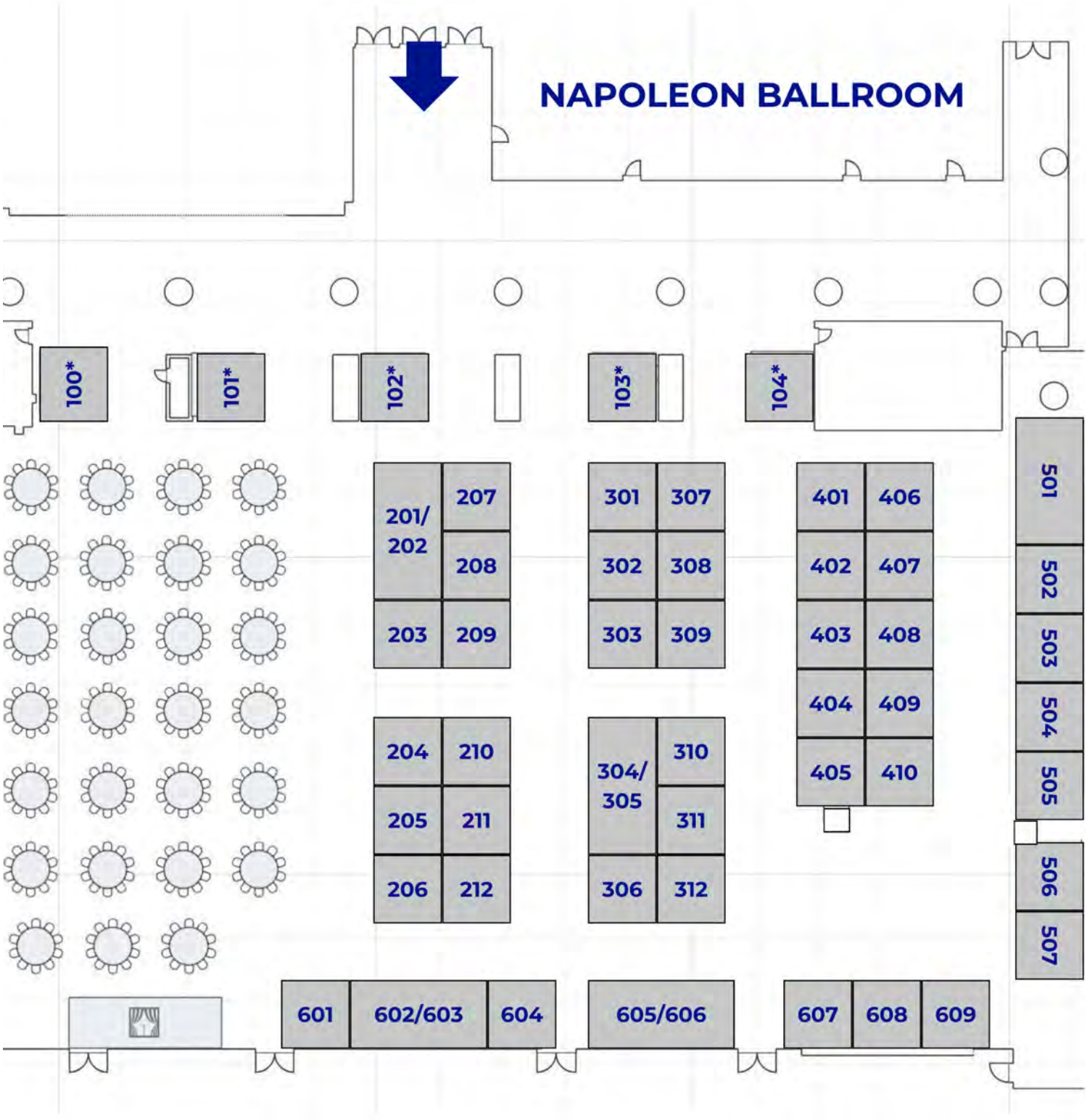
Exhibit Hall Layout



Exhibitor Descriptions

901E&T provides an extensive training course on MIL-DTL-901E. Presented by a previous Delegated Approval Authority (DAA) of NAVSEA, the instructor provides a history of the MIL-Spec and delves into the comprehensive arena of shipboard equipment shock qualification. By the end of the course, participants will have the knowledge/strategies to craft a streamlined, cost-effective shock qualification test schedule.

ACOUSTIC RESEARCH SYSTEMS provides direct field acoustic and environmental testing as a service to the aerospace and defense industries. Simulating rocket launches, with industry-renowned transparent data delivery and reliability, all with truly exceptional service.

ACUTRONIC USA has a proud history of building technologies and teams that are crucial to the aerospace, defense, and transportation industries. Acutronic's Simulation & Test Division is the global market leader in high-performance motion simulation and test equipment. Acutronic's Aerospace Components Division manufactures specialty components for use on uncrewed aerial vehicles, land defense applications, and missile systems.

ADVANCED TEST EQUIPMENT RENTALS primary focus is providing a complete rental solution of measurement and test equipment to industries such as Aerospace, Defense, Communications, EMC, and more. Our wide inventory, custom solutions, flexible terms, and quality support differentiates us from competitors as a complete solution for all test and measurement needs. Our inventory covers most electronic test applications and we are always expanding to remain the leading rental provider.

ALTAIR is a global leader in computational science and artificial intelligence (AI) that provides software and cloud solutions in simulation, high-performance computing (HPC), data analytics, and AI. Altair enables organizations across all industries to compete more effectively and drive smarter decisions in an increasingly connected world – all while creating a greener, more sustainable future.

BODIE TECHNOLOGY provides engineers with excellent software, training, and consulting resources to help analyze complex nonlinear mechanics problems, especially those involving problematic or noisy transient data. Bodie offers guidance on how to tackle a nonlinear mechanics problem, including best practices for utilizing FEA and physical testing methods.

BOEING'S LITTLE MOUNTAIN TEST FACILITY is a state-of-the-art test facility, Air Force Materiel Command laboratory dedicated to simulation testing of nuclear hardness, survivability, reliability and electromagnetic compatibility of defense systems. Center test laboratories simulate environments for nuclear radiation, air blast, shock and vibration, electromagnetic pulse, electromagnetic interference, and compatibility testing.

CORRELATED SOLUTIONS, INC. develops and manufactures turn-key Digital Image Correlation (DIC) measurement systems for non-contact full-field analysis of shape, motion, deformation, strain, and vibration applications. The VIC-3D HS FFT system is capable of measuring ODS's with frequencies up to 50 kHz with nanometer resolution and has a large dynamic range. Visit the booth to see new windowing function options and how they can be used to see distinct amplitude peaks in the frequency domain.

CRYSTAL INSTRUMENTS (CI) Is a leading worldwide supplier of vibration controllers, portable dynamic signal analyzers, and dynamic measurement systems for product testing, machine monitoring, and vibration and acoustic analysis. CI's products are used across a wide range of industries, including aerospace, defense, and medical device manufacturing.

CLARK TESTING has been providing product qualification testing and design verification for manufactures for over 50 years. We provide our clients with independent, objective, and competitively priced solutions to their testing needs. You will find that we are dedicated to delivering premium value to clients through superior technical expertise, advanced technology, and a deeply felt commitment to customer satisfaction. Our experience and dedication to testing helps assure that our customers in industries around the world qualify their products in an efficient manner.

Exhibitor Descriptions

DATA PHYSICS has been pioneering high-performance vibration testing and signal analysis in the aerospace, defense and automotive industries since 1984. We design and manufacture a range of air and water-cooled electrodynamic shakers, vibration controllers, and dynamic signal analyzers. Data Physics controllers lead the industry in multi-shaker vibration control, and our MIMO controllers are trusted to control the world's most advanced multi-shaker vibration tables. Data Physic control and safety technology was critical to the successful pre-launch testing of the James Webb Space Telescope, and Sierra Space Dream Chaser spaceplane.

DAYTON T. BROWN's tenured engineers provide experience in adapting our test equipment to meet the most challenging customer requirements. Our extensive test facility includes several shakers, anechoic EMI/EMC rooms, multiple chambers to perform a myriad of environmental tests and our newly expanded structural testing area with its 40ft ceiling. DTB is an A2LA and NVLAP accredited laboratory in accordance with ISO/IEC 17025 requirements and is ISO 9001:2008 and AS9100C registered.

DEWESOFT, a privately held company, is a World leading provider of data acquisition software and hardware serving all. The DEWESoft software and hardware synchronizes Analog, Digital, Video, GPS, CAN, ARINC 429/1553, PCM and Chapter 10 support. The instruments have wide temperate and shock ranges and are available in many configurations.

DEWETRON offers highly intuitive, end-to-end test and measurement systems designed to enhance predictability, efficiency, and safety across the globe. Our modular systems provide reliable measurement data and flexible, needs-based data acquisition capabilities, catering to the energy, automotive, transportation, and aerospace industries. Our strength lies in delivering customized measurement solutions that are ready-to-use and can be quickly adapted to the evolving needs of test environments and advanced technologies. With over 30 years of experience, innovation, and collaboration, DEWETRON has earned the trust and respect of the global market, with more than 25,000 DEWETRON measurement systems and over 400,000 measurement channels in operation at renowned companies worldwide.

E-LABS is a full-service testing laboratory featuring state of the art facilities, knowledgeable personnel, and simulation services such as test planning and fixture design. We perform climatic and dynamic testing, offer full EMI and EMC testing, and conduct specialized testing such as explosive atmosphere, high pressure, and helium leak detection.

Founded as NTS Technical Systems, today **ELEMENT U.S. SPACE & DEFENSE** brings more than 60 years of experience and expertise being tasked with the most complex projects and programs in the world. From centrifuge testing for the latest Mars rover, vibration testing for the Space Launch System (SLS), or environmental simulations for next-generation missiles, Element U.S. Space & Defense is the pioneering partner for highly custom, end-to-end, testing design and implementation.

ENDEVCO provides a complete range of dynamic test and measurement sensor solutions, including piezoelectric, piezoresistive, MEMS, and variable capacitance accelerometers, as well as angular rate, shock, and 6 DoF sensors, miniature pressure sensors, signal conditioners, cables and accessories. Our brand is recognized for highly reliability products with a wide range of testing applications, including automotive design and crash testing, aircraft and space vehicle testing, weapons and munition testing, and general lab testing. Endevco is an assumed name of PCB Piezotronics of North Carolina, Inc., which is a wholly-owned subsidiary of PCB Piezotronics, Inc. More info www.endevco.com

ETS SOLUTION is a world leader in High performance shakers. We are discussing our IPA series amp, designed to never fail a fuse, and our Extreme Acceleration Solid armature Y-connection "EASY" Ring, designed for up to 220 g sine and 180 g RMS Random. ETS Solutions offers affordable, high quality vibration test equipment. Utilizing extensive and innovative technical expertise ETS delivers a reliable long term solution to meet your test requirements. All systems comply with the European CE standards with full testing and certification from TUV-SUD Product Service GmbH.

Exhibitor Descriptions

DYTRAN BY HBK. is a leading manufacturer and designer of piezoelectric and DC MEMS sensors. Dytran offers a complete range of impulse hammers, piezoelectric force and pressure sensors, electronics, cables, and accessories for dynamic measurements, with full in-house customization capabilities.

HII is America's largest military shipbuilder. HII specializes in providing shock and vibration qualification and support through recognized expertise in testing and advanced shock analysis. HII is also the creator of the patented Deck Simulating Shock Machine (DSSM), the newest Navy approved test method in MIL-DTL-901E.

HI-TECHNIQUES has been a leader in High Performance Data Acquisition Systems for nearly 30 years. Initially founded as a spin off of Norland Corporation, Hi-Techniques has specialized in transient recorders, data acquisition systems and high resolution Digital Oscilloscope products for a variety of applications and markets. Our latest product range, the Synergy, is Hi-Techniques' 7th Generation of Data Acquisition Products. Designed from the ground up, Synergy offers unparalleled performance in data acquisition.

HI-TEST LABORATORIES, INC. is an unparalleled facility that has provided engineering, testing, and evaluation services to government and industry since 1975. HI-TEST is the undisputed leader in MIL-DTL-901E shock testing, housing all approved platforms at one convenient location. From pre-test analysis to post-test report generation, we offer our analytical engineering tools and expertise alongside our testing and design capabilities to make your test run as smoothly and efficiently as possible.

HUTCHINSON Defense and Mobility products have proven performance in all major modern conflicts from the first Gulf War to the Balkans, Iraq, Afghanistan and Syria. Hutchinson is trusted worldwide by soldiers to ensure their mobility and protection in all terrains and combat situations. Hutchinson provides innovative products and proactive support that exceeds customers' expectations and meets the demands of tomorrow's lighter and more survivable vehicles.

Headquartered in Long Island, NY, **IDC** is a leader in the design, engineering, and manufacture of Shock & Vibration Isolation systems for both military and commercial applications. Specializing in rugged, all-metallic wire rope isolators. IDC has amassed an impressive list of shock qualified systems for the US Navy and all branches of the military. IDC's unsurpassed experience and knowledge in the field of shock and vibration isolation, makes it possible for us to engineer a solution from early concept to final product. All of IDC's products are proudly made in the USA using only the highest quality domestic materials.

ITT ENIDINE DEFENSE designs and manufactures energy absorption, vibration isolation and shock systems for defense applications. These engineered products support applications in weapon systems, naval, transportation, and aviation. Products include elastomeric, hydraulic, mechanical shock isolation, as well as standard off the shelf products such as HERMS and Wire Rope Products.

JOHN EVANS' SONS has spent over 175 years redefining precision, performance, and reliability. Our expertise spans a diverse range of industries, from medical device and aerospace/defense to robotics and point of purchase. We ensure that mission-critical applications function flawlessly and set the standard for world-class precision spring products.

KISTLER is the global leader in dynamic measurement technology for pressure, force, torque and acceleration. As an innovation partner for industry, research and development, we enable our customers to achieve technological breakthroughs. In this way, we are making a decisive contribution to more efficient production processes and a more sustainable future.

M+P INTERNATIONAL is a worldwide provider of high-quality test and measurement solutions for vibration control, noise & vibration analysis and general data acquisition. By working closely with our customers, we understand their applications from an engineer's point of view and this is apparent in our products. A policy of continuous research and development, which has led to many pioneering solutions, ensures that our products demonstrate superior performance and quality.

Exhibitor Descriptions

MECALC TECHNOLOGIES AND COMPUTER METHODS have collaborated to create a new system for Pyroshock data acquisition using the ALI25 module and PhoenixKonnect software. The ALI25 is a high-bandwidth module designed for triggered/burst acquisition of Pyro-Shock and Mechanical Shock data, while PhoenixKonnect is a software application for transient event data acquisition and analysis.

MIDE / ENDAQ is a Hutchinson Company with brands that include: enDAQ shock, vibration & environmental sensors & software; Piezo.com Offering high-value piezoelectric products and expert solutions; and Mide's HydroActive Seal Products. Midé is a leading provider of advanced engineering products and services. Midé is committed to providing customers with high-quality deliverables that are on-time, on budget, and meet their expectations through the use of a quality management system focused on continual improvement. Midé uses industry best practices in both execution and cost effectiveness.

PCB manufactures vibration, pressure, force and strain, shock, and acoustic sensors used by design engineers and predictive maintenance professionals worldwide for test, measurement, monitoring, and control requirements. Our sensors support testing in aerospace and defense, automotive, transportation, civil engineering, and general R&D industries. Primary sensing technologies include piezoelectric (ICP®), piezoresistive, and capacitive MEMS. With a worldwide customer support team, 24-hour SensorLine, and a global distribution network, PCB is committed to Total Customer Satisfaction. PCB Piezotronics is a wholly-owned subsidiary of Amphenol Corporation.

PHOTRON has continually expanded their product line to aid in the advancement of photo optics and electronic technologies furthering research and development in the areas of digital imaging and slow motion analysis. Markets include microfluidics, military testing, aerospace engineering, automotive, broadcast, particle image velocimetry (PIV), digital image correlation (DIC), ballistics testing, and more.

POLYTEC has been bringing light into the darkness for more than 50 years. With over 400 employees worldwide we develop, produce and distribute optical measurement technology solutions for research and industry. Our quality innovative products have an excellent reputation internationally among the expert community. We find solutions tailored to our customers' requirements.

PRECISION FILTERS, INC. is a global provider of instrumentation for test measurements. You can rely on a single source for signal conditioning and switching—a complete range of instrumentation—products optimized to work together to provide high performance at reasonable cost. PFI designs and manufactures precision solutions that include a family of analog signal conditioning, filtering and switching systems. The 28000 Signal Conditioning System provides a complete range of transducer conditioning with up to 256 channels per chassis. Precision's solid-state switch provides up to 256x256 cross-point switching and replaces tedious manual patch panels. The PF-1U provides 8 or 16 channels of high performance filter/amplifiers in a compact package with Ethernet control.

RDI TECHNOLOGIES, INC. was founded in 2013 to commercialize video-based sensing technologies created in the lab at the University of Louisville. Since the beginning, our commitment has been to innovate using relatable video technology and easy-to-use software. In 2015 RDI Technologies invented and began the development of the first-to-market Motion Amplification® platform technology for motion and vibration detection and analysis using video. This product was released to the market in 2016 with rapid market adoption. With the release of the Iris M™, RDI created a new category of motion and vibration detection and revolutionized the way the Predictive Maintenance industry saw motion. We are poised to do the same in the Test and Measurements market over the next few years.

SHOCK TECH brings higher value and quality products to meet the most stringent industry standards. We design, manufacture and test shock attenuation and vibration isolation systems for the most demanding environments. We provide solutions for your equipment's dynamic protection problems and are experts at quick-turn, affordable results.

Exhibitor Descriptions

SHOCKMEC ENGINEERING is a small startup research and development company focused on shock testing and analysis. We have designed and produced our own resonant plate shock test system that is sized for convenient installation in almost any laboratory space. Resonant plate shock testing is intended to be representative of pyroshock and other similar high-energy, low-displacement shock events. Our company also performs shock design and analysis work as well as acoustics testing and design.

Simcenter is the **SIEMENS** software brand for addressing Predictive Engineering Analytics. The Simcenter portfolio consists of solutions that span 3D simulation, 1D simulation, and testing solutions. It is comprised of a number of well-known products such as Simcenter Test.Lab, NX Nastran, STAR-CCM+, Simcenter Imagine.Lab and Simcenter 3D. Simcenter Test Solutions specializes in testing for Acoustics, Structural Dynamics, Rotating Machinery, Durability/Fatigue and Vibration Control and are the market leader for high-end data acquisition and test results visualization and post processing.

The **SOCIETY FOR EXPERIMENTAL MECHANICS** is composed of members from academia, government, and industry who are committed to application, research and development, education, and promotion of experimental methods to: (a) increase knowledge of physical phenomena; (b) further understanding of the behavior of materials, structures and systems; and (c) provide the necessary physical basis and verification for analytical and computational approaches to the development of engineering solutions.

SOCITEC US is the leading American manufacturer of shock and vibration control systems. Our solutions protect and extend the life of the equipment and its surrounding. Socitec US leverages its expertise in vibration, shock, and dynamics to develop high performance solutions. These solutions are tested and approved by multiple international companies. The optimal solution requires comprehensive analysis of the dynamic system and a precise understanding of its reactions. Our team adopts a global approach that includes research, analysis, study, and solution design followed by installation and rigorous monitoring.

SPECTRAL DYNAMICS (SD) is a technically innovative company that has served the Shock and Vibration community for 56 years. Whether it's Sine control of challenging tests, innovative MIMO control of multiple shakers, Shock data capture at 5 Msample/s/channel or accurate Phase-locked acquisition of hundreds of channels of data, Spectral Dynamics uses mathematics effectively to reduce the total costs of dynamic testing. Call Spectral Dynamics for a customized solution to your needs in Vibration, Shock or Acoustic Test Control; Multi-Channel Data Acquisition; Modal Analysis or PIND Testing.

SPEKTRA has more than 20 years of experience in sensor calibration. As an accredited service provider and manufacturer of high-precision calibration solutions, SPEKTRA equips international institutes and industrial laboratories. SPEKTRA is strong of decades of experience in the development, manufacturing and retail of electronic measuring instrumentation.

TAYLOR DEVICES has provided innovative solutions for shock and vibration control since 1955. Our customers include all branches of the US Military and NASA Space Programs. Products include precise positioning shock isolators, fluid, elastomer and hydropneumatic spring-dampers, high capacity fluid dampers, and modular machined springs. Made 100% in the USA.

For over 10 decades, **VMC GROUP** has been recognized as a world leader in the design and manufacture of vibration isolation, seismic control and shock protection products. Our comprehensive product and engineering solutions cover a variety of industries – HVAC, industrial/vehicular, OEM and military/aerospace. Our full range of spring, elastomeric architectural mounts, wire rope isolators, curbs and bases are proven to meet and exceed specifications for any seismic, non-seismic, shock, or even bomb blast application.

Exhibitor Descriptions

TEAM CORPORATION continues to define the future of advanced, high-performance vibration test systems and solutions that advance the aerospace, defense and automotive industries. Pioneering the world of multi-axis test systems has led to the introduction of many state-of-the-art high frequency hydraulic and electrodynamic multi-axis test solutions, such as the CUBE and Tensor test systems. Utilizing advanced hydrostatic bearing technology that has been refined over the past 65 years, Team Corporation implements leading hydraulics engineering to solve unique problems that others cannot. Team has designed and engineered many ground-breaking test systems, some noteworthy examples are active within NASA's Space Environments Complex (SEC). This includes the most powerful spacecraft Reverberant Acoustic Test Facility (RATF), and the world's highest capacity and most powerful spacecraft shaker system – the Mechanical Vibration Facility (MVF)—where test programs for Orion/Artemis, and the Sierra Space Dream Chaser spaceplane were completed.

THORNTON TOMASETTI provides engineering design, investigation and analysis services to clients worldwide on projects of every size and complexity. We have 70 years of experience in research, testing and software development for the U.S. Navy and Department of Defense in the fields of blast, underwater shock, impact and vibration effects.

TIRA GMBH sets new trends with complete systems for industry and research. System technology from one hand for persistently enhanced safety and quality, competitive leads and image. The today's focus of TIRA comprises technical applications for measuring and testing. TIRA is specialised in the field of user-oriented projects, manufacture, and development of Vibration testing, Material testing and Balancing systems which are nowadays the three mainstays of the traditional enterprise.

VIBRATION RESEARCH (VR) has been the innovator in vibration control, data acquisition, and dynamic signal analysis since 1995. VR builds reliable and user-friendly software and hardware at its headquarters in Michigan, USA. It is attentive to emerging technologies and changes to the industries it serves. With every software release, the customer can expect new and relevant features meticulously tested before they reach them. Testing labs worldwide trust VR for the industry's best testing systems and support that delivers unrivaled value. Visit the VR booth to discuss your testing and analysis requirements with industry experts.

VIPER APPLIED SCIENCE has over three decades of experience between them in the fields of Blast, Shock & Vibration, Structural Dynamics, Computational Physics & Numerical Methods. All our team have a background in Engineering Consultancy, and the software we write and services we offer our clients reflect this. We pride ourselves in developing practical, usable, real world solutions that don't cost the earth.

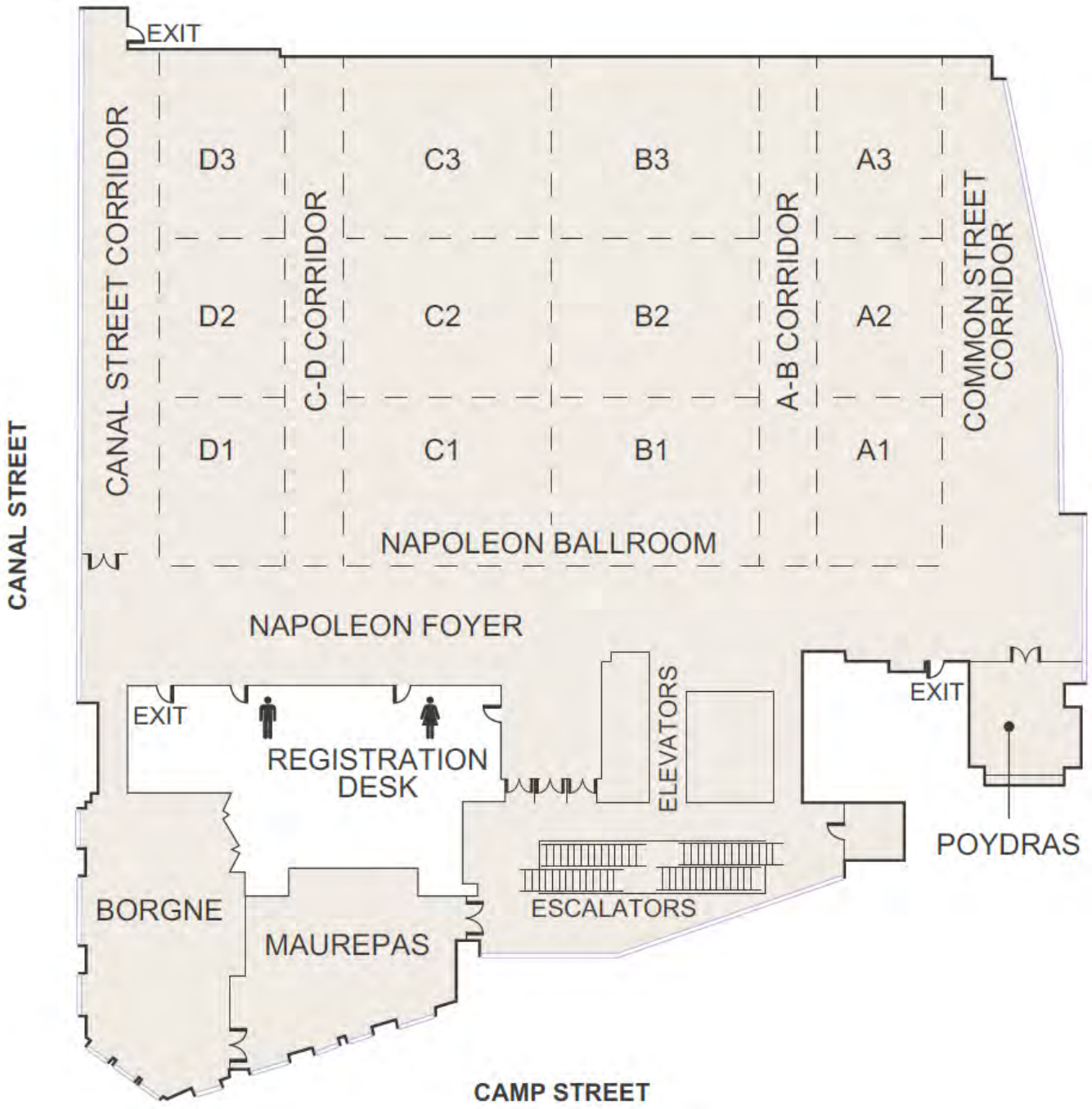
VISION RESEARCH designs and manufactures high-speed digital imaging systems that are used in military, industrial, academic, machine vision, and entertainment sectors. Phantom cameras allow you to analyze physical phenomena when it's too fast to see, and too important not toTM. Vision Research prides itself in the high resolution of its images, the power of its software, the reliability of its products and its high level of attentiveness and dedication to its customers. The company's innovative approach to high speed electronic "digital" imaging was recognized by the US Patent Office and was granted US Patent #5,625,412.

X-SIGHT, based in the heart of Europe, is a leading Czech company specializing in optical extensometers and non-contact deformation measurement. We combine sales, support, production, and development in one location, constantly adapting to meet customer needs. Our focus on innovative measurement techniques has made us a key player in the growing field of material testing. With a global network of resellers and distributors, we bring advanced measurement solutions to clients worldwide, demonstrating our commitment to precision and quality in every aspect of our work.

Sheraton Meeting Space Layout

THIRD LEVEL

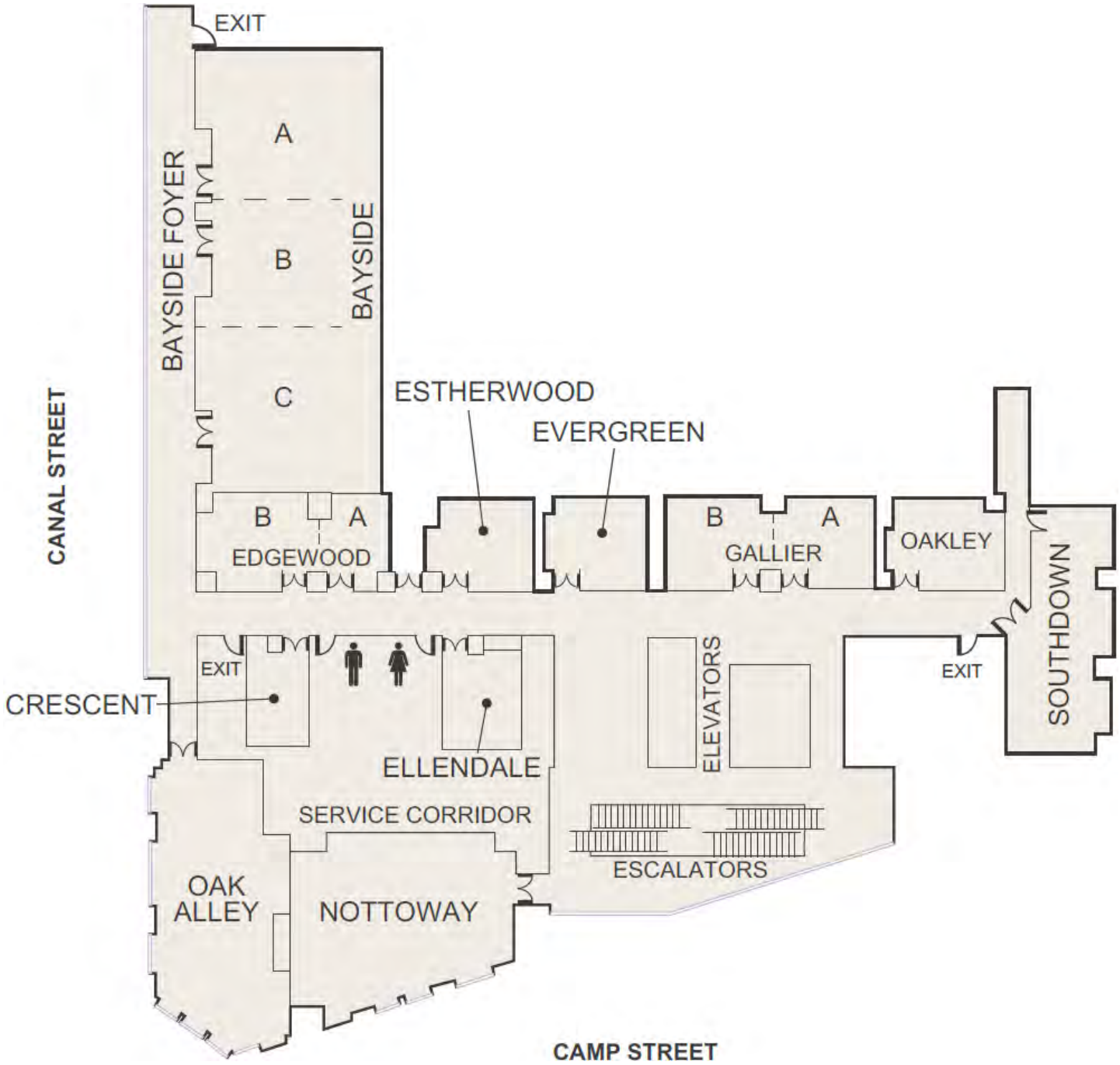
NAPOLEON BALLROOM & FOYER:	**EXHIBITS/GENERAL SESSION/MEALS**
BORGNE:	**TECHNICAL SESSIONS/TRAININGS**
MAUREPAS:	**TECHNICAL SESSIONS/TRAININGS**



Sheraton Meeting Space Layout

FOURTH LEVEL

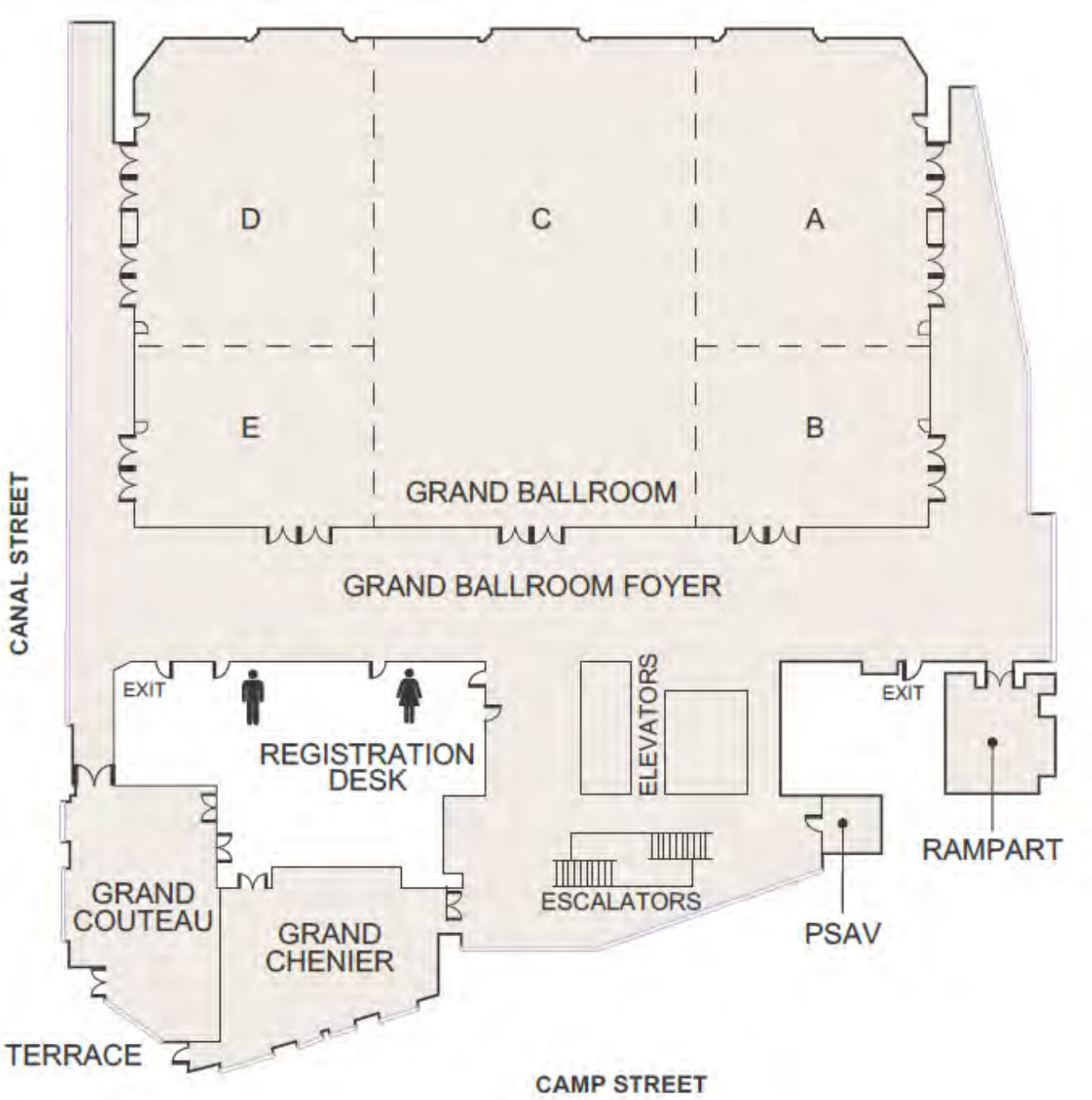
SOUTHDOWN:	**REGISTRATION & OPERATIONS**
OAK ALLEY:	**TECHNICAL SESSIONS/TRAININGS**
BAYSIDE A/B/C:	**TECHNICAL SESSIONS/TRAININGS**



Sheraton Meeting Space Layout

FIFTH LEVEL

GRAND CHENIER: **TECHNICAL SESSIONS/TRAININGS**



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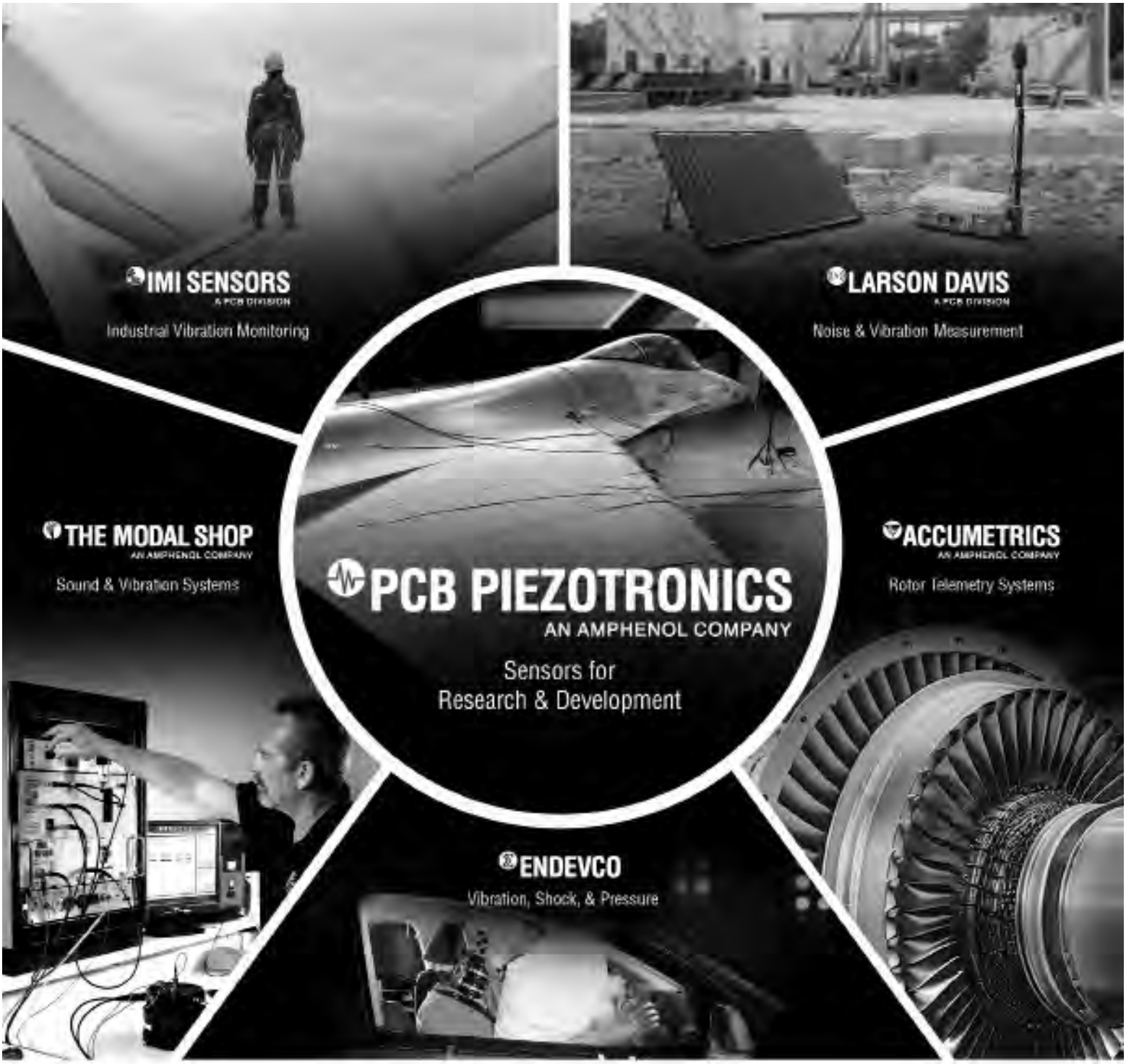

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