

QUICK CALENDAR

- **81st Symposium
Abstract Deadline
(June 30, 2010)**
- **Practical Shock
Analysis & Design
Course (August 16-20,
Middletown, RI)**
- **FREE Summer Semi-
nar & TAG Meeting
(July 28-29, 2010)—
Orlando, FL)**
- **Mechanical Shock
Testing Course
(July 12-16, Mon-
terey, CA)**

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SAVIAC

Shock and Vibration Information Analysis Center

JUNE 2010

CURRENT AWARENESS

2010 FREE SEMINAR AND SUMMER TAG MEETING ROSEN PLAZA HOTEL — ORLANDO, FLORIDA JULY 28-29, 2010

SAVIAC invites the shock and vibration community twice annually to attend a FREE seminar on Shock & Vibration. This summer's course will be held on July 28, 2010 in Orlando, FL in conjunction with the SAVIAC Summer Technical Advisory Group (TAG) Meeting. SAVIAC and featured experts in their disciplines organized this seminar to introduce participants to the SAVIAC community, while providing a valuable educational experience.

The Summer TAG meeting will be held following the seminar on July 29, 2010. SAVIAC uses the suggestions of its Technical Advisory Group on all planning activities, such as location, format, and technical content of planned events.

How to Register

The seminar is free, but you must register to attend. Please RSVP by contacting Ashley Shumaker by phone at (434) 581-3041 or via email at ashley.shumaker@saviac.org to assure your space and note packet. The Summer Seminar registration form and agenda are posted online. Please visit our website at www.saviac.org and use the link for the Summer Seminar and TAG Meeting.

Event Venue

The free seminar and TAG meeting will be held at the Rosen Plaza. A block of rooms has been reserved under the group name "SAVIAC." Reservations must be under the group name by July 5, 2010. The hotel can be reached at 800-627-8258 for reservations.

The hotel offers over 60,000 square feet of state-of-the-art, sophisticated meeting space, including the 26,000- square-foot Grand Ballroom and 22 distinctive meeting rooms. The Rosen Plaza Hotel has over 800 guest rooms, an indoor pool, and wireless high speed internet.

Local Attractions

This hotel is located at the center of Orlando's famous theme parks, only 15 minutes from downtown Orlando, across the street from Pointe Orlando shopping, and only 15

minutes from Orlando International Airport. Entertainment, dining, and shopping are all within walking distance of the hotel.

Universal Studios is less than five minutes from the Rosen Plaza Hotel. Universal Studios is a combination of many world class and technologically unique facilities: Universal Studios Florida® is the largest working film and television production studio outside of Hollywood.

Many popular Florida destinations can be visited during a trip to Orlando, including *Point Canaveral, Kennedy Space Center, and Harry P. Leu Gardens*, all within 45 minutes of the Rosen Plaza Hotel. Of course no visit to Orlando is complete without a visit to some of the most famous theme parks in America *Walt Disney World, SeaWorld, Busch Gardens* and many more— all within 10 miles from the Rosen Plaza.

More Details

The preliminary agenda for the FREE seminar can be found on page two of this newsletter. In addition, brief abstracts of each presentation supplement the agenda on page three.

(continued on page 2)

**FREE SUMMER SEMINAR
JULY 28, 2010 • ORLANDO, FL
ROSEN PLAZA HOTEL**



**FREE
SEMINAR**

Preliminary Agenda

7:30 – 8:00	Registration and Continental Breakfast	
8:00 – 8:15	Welcome & Introduction to SAVIAC	Dr. Bob Welch, SAVIAC Director Mr. Drew Perkins, SAVIAC Pgrm Mgr
8:15 – 9:00	(1) Selection and Analysis of Isolation for Shipboard Applications	Mr. Herb LeKuch Shocktech / 901D
9:00 – 9:45	(2) Damage Boundary Theory Primer	Mr. Jim Breault Lansmont Corporation
9:45 – 10:00	Break	
10:00 – 10:45	(3) Validation of Pyroshock Data	Dr. Vesta Bateman SAVIAC Consultant
10:45-11:30	(4) An Introduction to Underwater Implosion	Ms. Margaret Tang Weidlinger Associates
11:30 – 12:30	Lunch	
12:30 – 1:15	(5) Origins and History of Shock and Vibration (S&V) Requirements	Mr. James E. Howell NAVSEA Carderock
1:15-2:00	(6) US Navy Shock Policies: An Overview of the US Navy's Equipment Shock Qualification Process and Test Methods	Mr. Kurt Hartsough NSWCCD- Philadelphia
2:00 – 2:15	Break	
2:15 – 3:00	(7) Underwater Explosion Phenomena and Shock Physics	Mr. Fred Costanzo NAVSEA Carderock
3:00 – 3:45	(8) The Shock Response Spectrum – A Primer	Mr. Ed Alexander BAE Systems
3:45 – 4:30	(9) Introduction to MIL-STD-167 Vibration	Mr. Jeff Morris HI-TEST Laboratories

AN ONLINE REGISTRATION FORM IS AVAILABLE AT WWW.SAVIAC.ORG.

**PLEASE CONTACT ASHLEY SHUMAKER AT (434) 581-3041 OR
VIA EMAIL AT ASHLEY.SHUMAKER@SAVIAC.ORG WITH QUESTIONS.**

FREE SUMMER SEMINAR PRESENTATION ABSTRACTS

Selection and Analysis of Isolation for Shipboard Applications **Mr. Herb LeKuck, Shocktech/901D**

Shock and vibration isolation systems are proven methods of protecting COTS electronic equipment in severe dynamic environments. In many programs, the focus of US Navy test requirements is MIL-STD-167 (Vibration) and MIL-S-901D (Shipboard Shock). This presentation reviews the design and selection of isolation systems, what makes them effective, damage criteria, characteristics (and problems) of non-linearity, barge shock and vibration input levels, shock response spectra and methods of analysis. There is a brief discussion of isolation theory. Test data is reviewed and a video of the barge shock test is shown.

Damage Boundary Theory Primer **Mr. Jim Breault, Lansmont Corporation**

Fragility Assessment Theory and Test Procedure was originally presented by Robert E. Newton of the Naval Post Graduate School in Monterey, California in 1968 and contributed to the inception and growth of Lansmont Corporation. Since then this theory has been successful put into practice both for defense and commercial applications, from U.S. Navy mast mounted antennas to commercial laptop computers. This practice allows for the clear analytical definition of the shock characteristics that cause failure of a product. This presentation covers the basic theory, demonstrates the test procedure with an intuitive real-world demonstration “product”, and offers practical options for improving its inherent conservatism.

Validation of Pyroshock Data **Dr. Vesta I. Bateman, Consultant**

Abstract retracted.

An Introduction to Underwater Implosion **Ms. Margaret Tang, Weidlinger Associates**

Underwater implosion refers to the sudden inward collapse of a submerged pressure vessel. Of particular interest is the implosion response of pressure vessels under hydrostatic loading and the associated pressure waves that may be generated by this type of failure. This presentation will introduce basic concepts related to the fundamental physics of the implosion problem and development of finite element models to capture both the structural and fluid response.

Origins and History of Shock & Vibration Requirements **Mr. Jamie Howell, NSWC Carderock**

This presentation provides a brief overview of the origins and history of the Navy's underwater explosion (UNDEX) shock and shipboard vibration testing requirements. These requirements originated during World War II (WW II) and eventually evolved into MIL-S-901 for UNDEX shock and MIL-STD-167 for shipboard vibration. The presentation concludes by answering the question: "Why do S&V requirements exist?".

US Navy Shock Policies: An Overview of the US Navy's Equipment Shock Qualification Process and Test Methods **Mr. Kurt Hartsough, NAVSEA Carderock—Philadelphia**

No abstract provided.

Underwater Explosion Phenomena and Shock Physics **Mr. Fred Costanzo, NSWCCD**

This seminar presents an introduction to the fundamentals of underwater explosions, including discussion of the features of explosive charge detonation, the formation / characterization of the associated shock wave, bulk cavitation effects, gas bubble formation and dynamics, surface effects and shock wave refraction characteristics. Illustrations of each of fundamental aspect of underwater explosion (UNDEX) loadings are made with a set of videos from a variety of testing events. In addition, analyses of associated measured loading and dynamic response data, as well as descriptions of supporting numerical simulations of these events are presented. At the conclusion of this seminar, each of these UNDEX effects will tied together with a summary discussion and illustration.

The Shock Response Spectrum—A Primer **Mr. Ed Alexander, BAE Systems**

This topic provides a basic overview, or primer, of the shock response spectrum (SRS). The SRS was first conceived by Dr. Maurice Biot as described in his 1932 PhD thesis. It has been used to characterize the maximum system frequency response from shock environments. When used in conjunction with a multi-degree of freedom system model the SRS can be used to estimate the maximum dynamic motions of the system. The SRS has also been used as a design guideline to characterize the environment in which dynamic systems must survive for earthquakes, ballistic shock and naval shock.

MIL-STD-167 Type I Environmental Vibration Testing **Mr. Jeff Morris, HI-Test Laboratories**

Vibration testing is the shaking of a product to determine its ability to survive real world conditions. It has been proven that shipboard equipment that conforms to the requirements of MIL-STD-167-1A Type I vibration testing can satisfactorily perform its function aboard ship. Equipment not subjected to this type of testing is subject to experiencing failures induced by vibration in shipboard service. The primary purpose of Type I vibration testing is to prove the physical integrity and functionality of equipment when subject to a steady-state vibration environment. This presentation will introduce basic requirements presented in MIL-STD-167-1A and how this spec has been modified to address changing demands imposed by the Navy's newest shipbuilding programs.

CALL FOR PAPERS

81st Shock and Vibration Symposium
October 24-28, 2010
Rosen Plaza—Orlando, Florida

**ABSTRACTS DUE
JUNE 30**

Planning of the 81st Shock and Vibration Symposium is underway, with the selection of the Rosen Plaza in Orlando, FL.

The Shock & Vibration Symposium is the oldest US Government sponsored forum dealing specifically with the shock and vibratory response of air, sea, space, and ground vehicles and structures and blast effects. The Symposium was established as a mechanism for the exchange of information among Government activities, private industry, and academia on current work and new developments. Presentations on work in progress are encouraged. Separate sessions are held for presentation of classified or limited-distribution material.

The following is a list of suggested subject areas (other subject areas are welcome):

901D Case Studies	Environmental Databases	Seismic Shock
Active Vibration Control	Finite Element Analysis	Pyrotechnic Shock
Ballistic Shock	Fluid-Structure Interaction	Shock Characterization
Biodynamics	Ground Shock	Shock Hardening
Blast Design	Impact/Penetration Mechanics	Shock Qualification by Extension
Combined Environments	Instrumentation	Shock Test/Equipment Failure Modes
Computational Structural Dynamics	Isolation Systems	Simulation Methods
COTS	Large Structures	Specifications and Standards
Crash Dynamics	Live Fire Testing	System Identification
Damage Identification Damping	Machinery Diagnostics	Test Criteria
Data Analysis	Machinery Vibration	Test Tailoring
Dynamic Analysis Methods	Material Dynamic Properties	Underwater Shock Testing
Dynamic Measurement	Modal Analysis and Testing	Vibroacoustics
Dynamic Scale Modeling	Product Announcement/Facility Description	
Dynamic Testing		

If you have a specific group of papers or presentations, consider submitting them together as a dedicated session for the 80th symposium.

Two categories of presentations will be accepted: full papers, suitable for publication in the Symposium Proceedings; and short discussion topics, consisting of viewgraphs with no written paper. Full papers will have a 15 minute technical presentation time plus 5 minutes for questions, while short discussion topics will have a 10 minute presentation time with no question period.

Presentations will be accepted on the basis of their abstracts, which must be submitted by June 30, 2010. You are encouraged to submit online at www.saviac.org, click on 81st S&V Symposium Abstract Submittal. The Program Committee will review the abstracts during the July Program Committee meeting and authors will be notified of acceptance by August 13, 2010 (for on-time submittals). The full paper presentations must meet the following standards: They must be previously unpublished, must be appropriate to community interests and must not be overtly commercial, except for papers in the Product/Facility Session. Standards for short discussion topics are similar except that they may include previously presented or published material.

The Proceedings will be published on CD-ROM.

The paper due-date (for the proceedings) is February 28, 2011.

Questions should be directed to Drew Perkins, 434-581-3041, or drew.perkins@saviac.org.

SAVIAC Bids Final Farewell to Long-Time Participant Mr. Edward Noonan 1915 - 2010

Edward Francis Noonan, 94, died June 13 at his home in Annapolis. Mr. Noonan was born June 14, 1915, in New York City. He graduated from Manhattan College in 1937 with a Bachelor of Science in Engineering, and completed postgraduate work in Mechanical Engineering at New York University in 1938. He married Mary Alice Engelman in 1938 at Our Lady Queen of Peace Church, Staten Island, N.Y.



He began his career in naval engineering in the New York Navy Shipyard in 1937 and advanced to a position with the Navy Department in Washington, D.C. in 1939.

In 1941, he was commissioned a Lieutenant in the Civil Engineering Corps. In 1943, he transferred to the Naval Engineering Division of the U.S. Coast Guard and was commissioned as Lieutenant, United States Coast Guard. Following World War II, he returned to the Bureau of Ships of the Navy Department, where as head of the Vibration Research Division of BuShips, he provided in-house consulting services to various technical departments. In 1956, he was selected to join the Special Projects Office of the Bureau of Naval Weapons, which was responsible for developing the Navy's Ballistic Missile System. Mr. Noonan was a principal in the development of the Polaris Launching System which provided shock and vibration protection for the Polaris Missile. He concluded his government career as head of the Vibration Division, Acoustics and Vibration Laboratory of the David Taylor Naval Ship Research and Development Center where he developed the laboratory program in the field of ship vibration. He was awarded two Navy Superior Civilian Service Awards for his contributions in the field of vibration in 1960 and 1965.

Mr. Noonan was co-founder and president of the engineering firm Noonan, Knopfle, and Feldman (NKF), which specialized in the study of design, full scale trials and troubleshooting in the fields of ship vibration, acoustic and hull dynamics. In 1970, the firm became a consultant for Litton Industries, and was responsible for the vibration and acoustics program pertinent to the development of the Navy's DD 963, Spruance Class, Destroyer Program. NKF provided technical assistance in the development and design of the 125,000CM LNG (natural gas) Carriers for the El Paso Natural Gas Company from 1971-1989. The firm won a Competitive Level of Effort Contract for the U.S. Navy in 1975 and provided technical support for NAVSEA until 1989.

Mr. Noonan served on national and international committees, including the American Society of Mechanical Engineers (ASME), the Society of Naval Architects and Marine Engineers (SNAME), the American Society of Naval Engineers (ASNE), the International Ship Structures Committee and the International Standards Organization. He was awarded the grade of Fellow of ASME in 1969 and Fellow of SNAME in 1987. He authored a Ship Vibration Design Guide for the International Ship Structure Committee of the U.S. Coast Guard in 1989.



Watch the mail this summer for your copy of the 80th Shock and Vibration Symposium Proceedings

Check the website often. New information added regularly about the 81st Shock and Vibration Symposium.

Coming in July:

- Registration Forms

PRACTICAL SHOCK ANALYSIS AND DESIGN COURSE2010 Schedule and Locations

August 16-20	Middletown, Rhode Island
October 4-8	Washington, D.C.

About the Course

At the first Shock and Vibration Symposium in 1947, mechanical shock was defined as "a sudden and violent change in the state of motion of the component parts or particles of a body or medium resulting from the sudden application of a relatively large external force, such as a blow or impact." Since then the specific words used have changed somewhat but the meaning remains the same. Most analysts treat shock as a transient vibration. No matter how it is described or what source produced it, the effects of mechanical shock on structures and equipment create major design problems for a wide variety of systems.

This course will provide a comprehensive treatment of practical shock design and analysis with special emphasis on applications related to the design of ship structures and equipment for shock loads produced by underwater explosions.

Participants in this course will have an opportunity to increase their knowledge and understanding of the analytical and experimental tools that are available for shock design and qualification particularly with respect to requirements that are imposed for shipboard equipment. The lectures will provide a basic review of vibration and shock theory and will present the analytical and experimental methodology in the context of particular design applications. Analytical lectures will emphasize the physical significance of the results. Examples and case histories will be used as illustrations of design approaches; workshop problems that involve class participation will be used to advantage throughout the course. Class members will be encouraged to propose real design problems. The instructors will provide guidance for solutions or the problems may be used as class exercises.

Although this course is aimed primarily at shock design applications on ships, the analysis and design techniques presented are equally applicable to problems related to design for seismic loads or blast induced ground shock. Thus, engineers in these related areas may find the course to be useful. For all who participate, the course will provide a comprehensive coverage of shock design practice and a solid basis for further exploration of shock technology.

Instructors

Dr. Rudolph J. Scavuzzo, Mr. Henry Pusey, Mr. G. D.Hill, Mr. Jeffery Morris, Mr. Ed Alexander

Course Topics

Review of Basic Vibration Theory	Introduction to Mechanical Shock	Shock Measurement
Underwater Shock Phenomena	Multi-Degree-of-Freedom Systems	Navy Shock Qualification Process
Shock Qualifications by Test	Shock Qualification by DDAM	Shock Qualification by Extension
2-Dimensional Normal Mode Theory	Practical Design Considerations	Special Design and Analysis Tools
3-Dimensional Normal Mode Theory	Optimum Foundation Design	Use of Finite Element Analysis-DDAM
General Problem Solving Workshop		Review and Wrap-up Sessions

Course Registration

The Registration Fee is \$1700 per student. The registration is transferable to any person in the same organization. The fee includes a comprehensive set of course notes, a text book entitled Naval Shock Analysis and Design by Rudolph J. Scavuzzo and Henry C. Pusey, a Certificate of completion worth 3 CEUs, as well as a Continental Breakfast, Lunch and coffee breaks daily. A Registration Form may be printed out from the SAVIAC Web Site or may be requested from Sallie or Henry Pusey. As SAVIAC Technical Services Manager, Henry Pusey will arrange for the scheduling, management and presentation of all courses. All completed registration forms should be faxed or mailed to Sallie Pusey at the address given below.

For registration information contact:

Sallie Pusey, Course Registrar	Tel: (540) 678-8677
1877 Rosser Lane	Fax: (540) 678-8799
Winchester, VA 22601	email: saviac@comcast.net

NOTE: Registrants will be provided details about the course location and hotel(s) as soon as the course is firmly scheduled.

MECHANICAL SHOCK TESTING & DATA ANALYSIS2010 Schedule and Locations

July 12-16	Monterey, California
September 20-24	Huntsville, Alabama

About the Course

Mechanical Shock may be defined as a sudden change in velocity and is a major design consideration for a wide variety of systems and their components. The structural response to mechanical shock must be measured and characterized during the engineering development of these systems so that they will survive all environments during their service lifetime. These environments may include (but are not limited to): handling and transportation shocks, shocks during system delivery to a target, use impact shocks and shock originating from an explosive or pyrotechnic event. These different shock environments have quite a velocity change range from about 1 meter per second to 51 meters per second (40 - 2000 ips). Conversely acceleration magnitudes range from <1 g in earthquakes to 200,000 g in differentiated LDV measured pyroshocks.

This course will provide a comprehensive treatment of mechanical shock test techniques and data analysis for shocks from 100 g to 200,000 g. Mechanical shock instrumentation from low frequency techniques for underwater explosions (digitally filtered at 250 Hz as required by the US Navy) to high frequency techniques for ballistic shock will be reviewed in detail along with the techniques and data analyses to evaluate the instrumentation measuring these shocks.

Mechanical shock test techniques from package testing to conventional mechanical shock machines to pyroshock simulations and Hopkinson bar techniques will be presented. Design procedures for mechanical shock equipment will be discussed in detail. Where possible, theoretical bases for mechanical shock test techniques are provided. Mechanical shock data analysis and interpretation will be a major focus of all presentations and discussions and will include shock data examination and editing as well as interpolation, trend removal, and integration with MATLAB.

Instructors

Dr. Vesta Bateman, Dr. Howard Gaberson

Course Topics**Mechanical Shock**

- Introduction to Mechanical Shock
- Mech. Shock Instrumentation & Measurement
- Certification of Shock
- Instrumentation/Measurement devices
- Time & Frequency Domain Shock Specifications
- Shock Analysis using the Acceleration
- Shock Response Spectrum
- Revolutionary Treatment of Pyroshock with the Pseudo Velocity Shock spectrum
- Data Acquisition System Calibration/Use
- MATLAB Data Analysis
- Conventional Shock Testing Machines

- Navy Mechanical Shock Machines
- Pyroshock Testing and Simulation
- Component Pyroshock Simulations
- Accelerometer, MEMS, & Materials Evaluations
- Hopkinson Bar, Configuration & Certifications
- Commercial Laser Doppler Vibrometer Use
- Uncertainty Analysis

Pseudo Velocity Shock Spectra (PVSS) technology and applications including the following:

- PVSS on four coordinate paper defines shock severity level
- Severe shock frequency range defined by the PVSS plateau

- PVSS measurement of shock isolation protection
- Maximum modal stress given by the PVSS
- PVSS measurement of filtering; fast digital filter
- PVSS calculation ramp invariant filter theory
- Shock polarity measurement with the damped PVSS
- Continuous systems maximum stress from PVSS
- Max modal velocity is proportional max modal stress
- Evaluation of equipment shock fragility
- Damage capacity you are hiding by data filtering
- Review and Wrap-up Sessions

Course Registration

The Registration Fee is \$1700 per student. The registration is transferable. The fee includes a comprehensive set of course notes, a compilation of papers by Drs. Bateman and Gaberson, a text book entitled *Shock Data Analysis* by Rudolph J. Scavuzzo and Henry C. Pusey, a Certificate of completion worth 3 CEUs, as well as a Continental Breakfast, Lunch and coffee breaks daily. A Registration Form may be printed out from the SAVIAC Web Site or may be requested from Sallie Pusey (Course Registrar). As SAVIAC Technical Services Manager, Henry Pusey will arrange for the scheduling, management, and presentation of all courses. All completed registration forms should be faxed or mailed to Sallie Pusey at the address given below.

For registration information contact:

Sallie Pusey, Course Registrar
1877 Rosser Lane
Winchester, VA 22601

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email: saviac@comcast.net

NOTE: Registrants will be provided details about the course location and hotel(s) as soon as the course is firmly scheduled.

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Arvon, VA 23004

A LOOK INSIDE THE JUNE 2010 *CURRENT AWARENESS*



FREE Summer Seminar and TAG Meeting

- July 28 - 29, 2010

81st Shock and Vibration Symposium

- Call for Papers

Final Farewell to Mr. Edward Noonan

Course Announcements

- SAVIAC's Practical Shock Analysis & Design
- SAVIAC's Mechanical Shock Testing & Data Analysis

The Current Awareness newsletter is published by the Shock and Vibration Information Analysis Center, which is operated by HI-Test Laboratories, Inc., under contract to the U.S. Army Engineer Research and Development Center.

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