SAVIAC
Shock and Vibration Information Analysis Center

JUNE 2009 CURRENT AWARENESS

QUICK CALENDAR

- Practical Shock Analysis & Design Course - August 17-21, San Diego, CA
- Mechanical Shock Testing & Data Analysis Course—September 21-25, Huntsville, AL
- 80th Symposium Abstract Deadline Extended: July 31, 2009
- 80th Shock and Vibration Symposium—October 25-29, 2009

INSIDE THIS ISSUE:

2009 FREE Seminar & Summer TAG Meeting
Paradise Point Resort & Spa — San Diego, CA
Held June 24—25, 2009

SAVIAC invites the shock and vibration community twice annually to attend a FREE seminar on Shock & Vibration. This summer's course was held on June 24, 2009 in San Diego, CA 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 was held following the seminar on June 25, 2009. SAVIAC uses the suggestions of its Technical Advisory Group on all planning activities, such as location, format, and technical content of planned events.

Event Venue

The free seminar and TAG meeting was held at the Paradise Point Resort & Spa. The resort is located on a private, 44 acre island on Mission Bay. This venue will also be the host of our upcoming 80th Shock and Vibration Symposium. Visit the resort online at www.paradisepoint.com.

Area Information

California's second largest city and the United States' eighth largest, San Diego boasts a citywide population of nearly 1.3 million residents. San Diego is renowned for its idyllic climate, 70 miles of pristine beaches and a dazzling array of world-class family attractions. Popular attractions include the world-famous San Diego Zoo and Wild Animal Park, Sea World San Diego and LEGOLAND California. San Diego offers an expansive variety of things to see and do, appealing to guests of all ages from around the world.

Future Events

If you were not able to join us for this seminar, but wish to take advantage of future opportunities, please review the abstracts and agenda on the following pages. Our seminars are structured to give a sample of the array of topics addressed at our annual symposium.

Abstracts on page 2
Agenda on page 3

For more information on any article found in this addition of *Current Awareness*, please visit www.saviac.org.

US Army Corps of Engineers Engineer Research and Development Center

ATEST LABORATORIES, INC.

FREE Shock & Vibration Seminar
June 24, 2009 - Abstracts

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?".

Explosion Effects in Air, Water, and Soil
Dr. Bob Welch, US Army Corps of Engineers (ERDC)

The effects of detonations from high explosives have unfortunately become a challenge for the civilian as well as the military community. This presentation provides basic information about explosions for the practicing engineer. Blast effects phenomena associated with explosions in air, water, and geologic media are described. Simple equations that predict blast field parameters in water, air, and soil as a function of charge weight and range are given. Explosion-induced cratering phenomena in soil and rock are described. Airblast reflection phenomena are covered and relationships that quantify the reflected waves as a function of incident pressure and incident angle are given.

Applications of Shock and Vibration Isolation and Damping Systems
Mr. Alan Klembczyk, Taylor Devices

This presentation provides an outline of applications and methods of implementing isolation, shock absorbing and damping within a wide array of dynamic systems and structures. A significant visual representation is provided through the use of photos, videos, and graphical results that demonstrate examples that have been proven effective and reliable in the past. Additionally, key definitions and useful formulae are presented that will provide the analyst or systems engineer with an initial path forward with respect to solving typical problems within commercial, military, and aerospace sectors.

Underwater Implosion
Ms. Margaret Tang, Weidlinger Associates

Implosion is the sudden inward collapse of a pressure vessel. Of particular interest is the implosion response of pressure vessels under hydrostatic loading and associated pressure waves that may generate from 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.

Underwater Explosion Phenomena and Shock Physics
Mr. Dave Huntley, Lansmont Corporation

No abstract provided.

Sources of Corrupted Pyroshock Data
Dr. Vesta Bateman, SAVIAC Technical Consultant

Recent events in the pyroshock testing community during the last year have shown that corrupted pyroshock data are still being taken at both government agencies and private companies. The sources of data contamination appear to be the usual culprits that have been known for some time: digital aliasing and offsets in the data. The cause of digital data aliasing is, but not limited to, inadequate analog filtering prior to digitization and inadequate bandwidth of the data acquisition system. Offsets in the acceleration data are generally caused by accelerometer malfunction and in some cases data acquisition system problems such as inadequate slew rate capability. The remedies for these problems are readily available, so why are corrupted pyroshock data still acquired? Three reasons that cause corrupted pyroshock data will be explored.

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.

Shock Response Spectrum (A Primer)
Ed Alexander, BAE Systems

No abstract provided.

SUMMER 2009 SHOCK AND VIBRATION SEMINAR
FINAL AGENDA

June 24, 2009
Paradise Point Resort & Spa
San Diego, CA

7:30-8:15	Registration & Continental Breakfast	
8:15-8:30	Welcome & Introduction to SAVIAC	Dr. Bob Welch, SAVIAC Director Mr. Drew Perkins, SAVIAC Program Mgr
8:30-9:15	**(1) Origins and History of Shock and Vibration (S&V) Requirements**	**Mr. Jamie Howell** NAVSEA Carderock
9:15-10:00	**(2) Explosion Effects in Air, Water and Soil**	**Dr. Bob Welch** U.S. Army Corps of Engineers (ERDC)
10:00-10:25	Break	
10:25-11:10	**(3) Applications of Shock & Vibration Isolation and Damping Systems**	**Mr. Alan Klembczyk** Taylor Devices
11:10-11:55	**(4) An Introduction to Underwater Implosion**	**Ms. Margaret Tang** Weidlinger Associates
11:55-1:00	Lunch	Hosted by National Technical Systems
1:00-1:45	**(5) Evolutionary Changes in Horizontal Shock Testing**	**Mr. Dave Huntley** Lansmont Corporation
1:45-2:30	**(6) Sources of Corrupted Pyroshock Data**	**Dr. Vesta Bateman** Consultant
2:30-2:55	Break	
2:55-3:40	**(7) Underwater Explosion Phenomena & Shock Physics**	**Mr. Fred Costanzo** NAVSEA Carderock / UERD
3:40-4:25	**(8) Shock Response Spectrum (A Primer)**	**Mr. Ed Alexander** BAE **Systems**

IF YOU HAVE QUESTIONS ABOUT THIS SEMINAR OR ANY FUTURE EVENTS,
PLEASE CONTACT ASHLEY SHUMAKER:
ASHLEY.SHUMAKER@SAVIAC.ORG - (434) 581-3041

SAVIAC Exhibits at Test Week 2009
Von Braun Center ● Huntsville, Alabama
June 2 - 4, 2009

For the second year in a row, SAVIAC participated as an exhibitor at Test Week 2009. This year's event was held at the Von Braun Center in Huntsville, Alabama from June 2nd to June 4th. This year's theme was "Changing our T&E processes to be more responsive to the needs of our customer: Right Size, Right Price, Right Stuff….Best Value."

Represented by Mr. Drew Perkins, Program Manager, and Mrs. Ashley Shumaker, Program & Event Coordinator, SAVIAC was able to disseminate information to army and aerospace audiences to benefit the shock and vibration community as a whole.

If you would like more information about technical or exhibition aspects of Test Week 2009, or about future events, please visit www.testweek.org.

Explosion Effects and Structural Design for Blast
Drury Inn and Suites in Albuquerque, NM
November 3 - 4, 2009

Engineers, architects, first responders, builders and others will benefit from learning about explosion effects, protective design methods, and retrofit techniques. Most new government buildings now require some level of blast resistant design and many facilities require retrofitting to meet anti terrorism bomb protection criteria; this training will address those requirements. Each participant will receive a certificate indicating 15 Professional Development Hours that can be used to meet continuing education requirements in most states for professional engineers. The course will focus on the fundamentals of explosion effects, determining blast loads on structures, computing structural response to blast loads, and the design and retrofit of structures to resist blast effects. The emphasis will be on terrorist threats from vehicle bombs, but the fundamental concepts can be applied to other explosive scenarios. Currently available software and publications for blast effects and design guidance will be demonstrated and discussed. Much of the design guidance and software are restricted distribution to government agencies and their contractors, however specific information on how qualified users may obtain the software will be provided. Several computer programs for blast effects and blast design calculations have recently been developed by the government for general release to the public and those programs will be discussed along with instructions on how to obtain the software. All of the software and references discussed in this course are available free of charge to qualified users. Participants will gain an understanding of how to compute explosion effects like overpressure, reflected pressure, and impulse; how to calculate the resulting blast loading on a structure; how to compute structural response to blast loading; and practical methods for designing and retrofitting structures to resist blast effects. Participants will be provided a complete set of bound class notes. Participants may check in beginning at 7:30 am on Nov 3 and the course will run 8am - 5pm each day. Lunch along with refreshments at breaks will be provided for participants each day. For more information about course details, visit http://www.blastdesigntraining.com/ where on-line registration is available. Questions should be directed to Dr. Sam Kiger, 573-882-3285, , KigerS@missouri.edu or Dr. Stan Woodson, 601-636-4429 woodsoneng@netzero.net.

The course will take place at the Drury Inn & Suites in Albuquerque, NM. For reservations call 1-800-378-7946 (1-800-DRURYINN) and mention "Explosion Effects Training" for the reduced $107/day course room rate; or click on the link below. http://www.druryhotels.com/Reservations.aspx?groupno=2065314 A block of rooms will be held until Friday, Oct 2.

CALL FOR PAPERS

80th Symposium

80th Shock and Vibration Symposium
October 25-29, 2009
Paradise Point Resort & Spa—San Diego, CA.

Planning of the 80th Shock and Vibration Symposium is underway, with the selection of the Paradise Point Resort & Spa in San Diego, CA.

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

If you have a specific group of papers or presentations, consider submitting them together as a dedicated session for the 79th 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 **JULY 31 2009**. You are encouraged to submit online at www.saviac.org, click on 80th 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 July 31, 2009 (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, 2010.
Questions should be directed to Drew Perkins, 434-581-3041, or drew.perkins@saviac.org.

SAVIAC Course

Course Announcement

PRACTICAL SHOCK ANALYSIS AND DESIGN COURSE

2009 Schedule and Locations

March 2-6	(Hampton, VA)
May 18-22	(Charleston, SC)
August 17-21	(San Diego, CA)

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

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 $1500 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
1877 Rosser Lane
Winchester, VA 22601

Tel: (540) 678-8677
Fax: (540) 678-8799
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.

SAVIAC Course

Course Announcement

MECHANICAL SHOCK TESTING & DATA ANALYSIS

2009 Schedule and Locations

March 30-April 3 (Hampton, VA)
September 21-25 (Huntsville, AL)

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 hidden by data filtering
Review and Wrap-up Sessions

Course Registration

The Registration Fee is $1500 per student. The registration is transferable to any person in the same organization. The fee includes a comprehensive set of course notes, a compilation of papers by Instructors Bateman and Gaberson, a text book entitled S*hock 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, SAVIAC Course Registrar (Contact Information below) . A Registration Form (available mid-Dec '07) 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.

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A LOOK INSIDE THE FEBRUARY 2009 *CURRENT AWARENESS*

2009 Summer TAG Meeting & Free Seminar

Course Announcements

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

80th Symposium—Call for Papers

Abstract Due Date Extended to July 31, 2009

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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