SAVIAC
Shock and Vibration Information Analysis Center

FEBRUARY 2009 CURRENT AWARENESS

QUICK CALENDAR

- 2009 Winter TAG & Free Seminar—Virginia Beach, VA.
- Practical Shock Analysis & Design Course (March 2-6, 2009—Hampton, VA)
- Mechanical Shock Test Techniques & Data Analysis Course (Mar30– Apr 3 2009—Hampton, VA)

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2009 FREE Seminar & Winter TAG Meeting
The Cavalier Hotel — Virginia Beach, VA.
March 18 - 19, 2009

SAVIAC invites you to attend a FREE seminar on Shock & Vibration. The course will be held on March 18, 2009 in Virginia Beach, VA in conjunction with the SAVIAC Winter Technical Advisory Group (TAG) Meeting. SAVIAC and featured experts in their disciplines have organized this seminar to introduce participants to the SAVIAC community, while providing a valuable educational experience.

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

The Winter TAG meeting will be held following the seminar on March 19, 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 will be held at the Cavalier Hotel. A block of rooms has been reserved under the group name "SAVIAC." Reservations may be under the group name until the date of the event. The hotel can be reached at (757) 425-8555 or using the following link: http://www.cavalierhotel.com.

Area Information

Centrally located on the East Coast, Virginia Beach is within a day's drive of two-thirds of America's population. Bordered by the Atlantic Ocean and the Chesapeake Bay, the Virginia Beach area offers miles of beaches, lively centers of entertainment, and quiet beach retreats. While Virginia Beach is the largest city in the state of Virginia, the destination is located in a peaceful wilderness serene. Visitors are encouraged to tour the nature trails, aquariums, and other treats that a vacationer or businessman alike would enjoy.

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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
March 18, 2009 - Abstracts

Application of Flexibility Factors in Piping Systems
Dr. Rudy Scavuzzo, SAVIAC

Calculated stresses in piping from thermal, dynamic or other loads depend on the flexibility of piping systems. Elbows and other piping components require detailed finite element analysis if accurate flexibilities are to be obtained. In order to simplify the modeling process, flexibility factors are employed in piping coded so that elbows or other piping components can be modeled using simple curved beams with no ovalization or even two straight pipes at right angles for a 90^0 elbow. For a curved beam with no ovalization, the flexibility factor accounts for the added flexibility associated with ovalization; in the case of two straight beam joined at a corner, the flexibility factors includes accounts for both the curvature effect and the ovalization of the cross section. Flexibility factors are tabulated in the ASME Boiler and Pressure Vessel Code tabulates values as a function of h, the elbow characteristic.

High Speed Photography
Dr. Eric Rinehart, DTRA

Certainly everyone is an expert on photograph, high speed photography and their use in analyzing high explosive events. This seminar is divided into three main parts:

- Descriptions of the three major parts of any photographic device,
- Use of film in the high speed business and the transition of digital formats,
- Several examples of unique uses of digital photography not available to film.

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.

MIL-S-901D Heavyweight Shock Testing
Mr. Travis Kerr, HI-Test Laboratories

This training will cover the necessary background information relative to heavyweight shock testing. This session is intended for engineers who are unfamiliar with the heavyweight shock testing process. Subjects covered include pre-test planning, procedure preparation, fixture design, test set-up and operations, instrumentation interpretation, and reporting. Use of the floating shock platforms will be covered. MIL-S-901D test requirements applicable will be discussed.

Shock Qualification Process
Kurt Hartsough, NSWCCD

No abstract provided.

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 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.

Using Energy to Describe Mechanical Shock and Random Vibration
Mr. Tim Edwards, Sandia National Labs

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.

WINTER 2009 SHOCK AND VIBRATION SEMINAR AGENDA

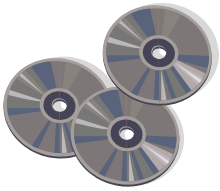
March 18, 2009
Cavalier Hotel
Virginia Beach, VA

7:30 –8:15am	Registration/Continental Breakfast	
8:15 –8:30	Welcome & Introduction to SAVIAC	Dr. Bob Welch, SAVIAC Director Mr. Drew Perkins, SAVIAC Prgrm Mgr
8:30 –9:15	**(1) Shock Qualification Process**	**Mr. Kurt Hartsough, NSWCCD**
9:15 – 10:00	**(2) High Speed Photography**	**Dr. Eric Rinehart, DTRA**
10:00 – 10:15	Break	
10:15–11:00	**(3) Application of Flexibility Factors in Piping Systems**	**Dr. Rudy Scavuzzo, SAVIAC**
11:00–11:45	**(4) MIL-S-901D Heavyweight Shock**	**Mr. Travis Kerr, HI-Test Laboratories**
11:45 – 1:15	Lunch (provided)	
1:15 – 2:00	**(5) Underwater Implosion**	**Ms. Margaret Tang, Weidlinger Associates**
2:00 – 2:45	**(6) Using Energy to Describe Mechanical Shock and Random Vibration**	**Mr. Tim Edwards, Sandia National Labs**
2:45 – 3:00	Break	
3:00 – 3:45	**(7) Underwater Explosion Phenomena and Shock Physics**	**Mr. Fred Costanzo, NSWCCD**
3:45 – 4:30	**(8) Introduction to MIL-STD-167 Type I Environmental Vibration Testing**	**Mr. Jeff Morris, HI-Test Laboratories**

PLEASE CONTACT ASHLEY SHUMAKER TO REGISTER
ASHLEY.SHUMAKER@SAVIAC.ORG
(434) 581-3041

PROCEEDINGS DEADLINE: March 31, 2009

There were a record number of presentations at this year's symposium in Orlando. As such, it is requested of all authors to submit the paper that corresponds to presentations delivered in at the 79th Shock and Vibration Symposium. The greater the number of papers submitted, the greater the benefit of the proceedings to the SAVIAC community.



In 2008 we were able to release the proceedings disks earlier than in previous years. We hope to do the same in 2009, meaning that our deadline of March 31 will be crucial to this goal.

All papers received by the deadline, and those papers that are received while we prepare the proceedings CDs after the deadline, will comprise the 79th Shock and Vibration Symposium Unlimited and Limited proceedings. However, if you are unable to make the March 31 deadline, your paper should still be submitted so it may appear in later symposia proceedings.

If someone in your organization presented a paper at the 79th symposium in Orlando, please remind them of the March 31 deadline if they have not yet sent in their paper. Your assistance will help make the 79th proceedings of greater benefit to the SAVIAC community.

Please contact Ashley Shumaker by phone at (434) 581-3041 or email your paper submittals and release forms to ashley.shumaker@saviac.org.

SAVIAC Activities at IMAC XXVII

SAVIAC has had an exchange agreement with the Society of Experimental Mechanics (SEM) under which SAVIAC may exhibit and sponsor Technical Sessions at the International Modal Analysis Conference (IMAC) with SEM enjoying similar privileges at SAVIAC Shock and Vibration Symposia. This cooperative arrangement has proved to be beneficial to both organizations.

Most recently at IMAC 2009 in Orlando, Florida the SAVIAC Exhibit was managed by Ashley Shumaker, Program and Event Coordinator for SAVIAC, and Lauren Yancey. A Shock and Vibration Session was organized and co-chaired by Henry Pusey, Manager of Technical Services, and Dr. Howard A. Gaberson. The session consisted of four papers that in part represent the broad technical interests of the SAVIAC community. The papers, presented by SAVIAC regulars Fred Costanzo, Ed Alexander, Howard Gaberson and Alan Klembczyk, are listed below.

An Overview of UERDTools Capabilities: A Multi-purpose Data Analysis Package;
P.A. Mantz and F.A. Costanzo, Naval Surface Warfare Center

The Shock Response Spectrum – A Primer;
J.E. Alexander, BAE Systems

Pseudo Velocity Shock Spectrum Analysis Data Editing;
H.A. Gaberson, Consultant

Introduction to Shock and Vibration Isolation and Damping Systems;
A.R. Klembczyk, Taylor Devices, Inc.

We noted that in this IMAC Program there were two other sessions on Shock and Vibration, presumably formed from contributed papers. We are pleased that this important technology is being more widely disseminated at SEM conferences. Perhaps this indicates that our cooperative efforts are bearing fruit. Finally, we extend sincere thanks to the SEM Headquarters Staff for their outstanding cooperation and support. We expect to see many of you at the 80th Shock and Vibration Symposium in San Diego this October and at the IMAC 2010 in Jacksonville.

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 June 15, 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)
October 5-9	(Princeton, NJ)

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	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.

SAVIAC Course

Course Announcement

MECHANICAL SHOCK TEST TECHNIQUES & DATA ANALYSIS

2009 Schedule and Locations

March 30-April 3	(Hampton, VA)
July 13-17	(Minneapolis, MN)
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 4 g's in earthquakes to 200,000 g's 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's to 200,000 g's. 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, Mr. Jeffery Morris

Course Topics
Course Registration

Introduction to Mechanical Shock
Mechanical Shock Measurement
Mechanical Shock Instrumentation
Certification of Shock Instrumentation/ Measurement Devices
Time Domain Shock Specifications
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 for Components and Full Scale Systems
Underwater Explosion Testing
Navy Mechanical Shock Machines
Pyroshock Testing and Simulation
Full-Scale Pyroshock Tests and Simulations
Component Pyroshock Simulations Including Apparatus and Fixture Design

Accelerometer, MEMS, and Materials Evaluations
Hopkinson Bar Theory
Hopkinson Bar Certifications
Hopkinson Bar Materials and Configurations
Commercial Laser Doppler Vibrometer use and Certification
Uncertainty Analysis
Review and Wrap-up Sessions

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 *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, 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.

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.

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A LOOK INSIDE THE FEBRUARY 2009 *CURRENT AWARENESS*

2008 Winter TAG Meeting & Free Seminar

Course Announcements

- SAVIAC's Practical Shock Analysis & Design
- SAVIAC's Mechanical Shock Test Techniques & Data Analysis

80th Symposium—Call for Papers

March 31, 2009—Proceedings Deadline

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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