SAVIAC
Shock and Vibration Information Analysis Center
Current Awareness
June 2004

Hazard Assessment Tests of Explosive Munitions Under MIL-STD-2105

Editor's Note: This is the second in a series of articles high-lighting this year's featured government agency, Naval Surface Warfare Center, Dahlgren Division.

Although safety is a fundamental consideration in the acquisition of all weapons systems, it is particularly critical for explosive munitions. The consequences of accidents involving explosive munitions can be devastating: lives lost, serious injuries, extensive property damage, and loss of critical warfighting capabilities, to name just a few. Accordingly, system safety programs for these items will generally incorporate extensive testing to evaluate their responses to a broad range of threat environments. These threat environments may include extreme naturally-occurring environments, such as those found in desert or arctic regions; induced environments associated with normal logistics and deployment, such as shock and vibration; mishaps, such as fires; and combat threats, such as impact by fragments.

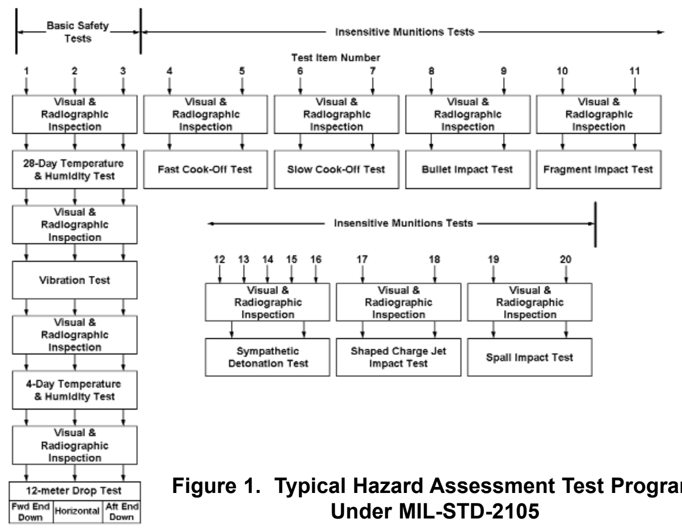

Figure 1. Typical Hazard Assessment Test Program Under MIL-STD-2105

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Mel Baron Award Nominations Sought

From the SAVIAC Director

Many of us had the good fortune to know Dr. Mel Baron. Mel Baron was a technical giant in our community. His specialty was computational structural dynamics and constitutive modeling. Dr. Baron received many awards during his plus 45-year career including ASCE's Walter Huber and Arthur M. Wellington Awards, and ASCE's Nathan M. Newmark and the J. James Croes Medals. He was a member of the National Academy of Engineering and a Fellow of the ASME. But more than these awards, Dr. Baron was an outstanding community leader who provided rich encouragement to young professionals, and wise counseling to seasoned researchers. I had the great pleasure of knowing Dr. Baron from both perspectives.

In 1998, with financial assistance from Weidlinger Associates, SAVIAC established the Mel Baron Award to honor Dr. Mel Baron, and to encourage others to follow in his path of community enrichment and technical leadership. The Award specifically recognizes individuals who have made outstanding technical contributions to the field of shock and vibration in computational structural dynamics and related specialties. The Award may also be given in recognition of an individual's lifetime achievements whose cumulative effect has been to advance the state of the art in the field. Demonstrated personal leadership and contributions to the shock and vibration community are considered as well. The Mel Baron Award winners to date are giants in their own right and are, in order: Dr. Eugene Sevin, Dr. Ted Belytschko, Dr. Walter Pilkey, Dr. Thomas Geers, Mr. George O'Hara, and Dr. Ivan Sandler. At the suggestion of the Mel Baron Nominating Committee, we have revamped our process for selecting Mel Baron Recipients, making some parts of the nominating process less onerous, while maintaining the high standards for this important award. A new nominating form was created. It is on our web site at www.saviac.org/Awards/Mel_Baron. The Award Committee may contact the references indicated on the form.

I encourage those of you who know of a deserving giant in our community to submit their name to SAVIAC, ATTN: Mel Baron Award Committee, by 16 August. Contact the SAVIAC Program Manager, Mr. Joel Leifer, if you have questions.

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TABLE 1 - Basic Safety Tests

28-Day Temperature and Humidity (T&H)	Bullet Impact
Vibration	Fragment Impact
4-Day Temperature and Humidity (T&H)	Sympathetic Detonation
12-Meter Drop	Shaped Charge Jet Impact
Fast Cook-Off	Spall Impact
Slow Cook-Off	

Many of these threat environments are addressed by the tests defined in MIL-STD-2105, Hazard Assessment Tests for Non-Nuclear Munitions. These tests, which are identified Table 1, are intended to evaluate the basic safety and insensitive munitions (IM) characteristics of explosive munitions. MIL-STD-2105 is applicable to all non-nuclear munitions, munition sub-systems, and explosive devices; and thus, the Hazard Assessment Tests are a key element of the system safety program for most explosive munitions.

A typical Hazard Assessment Test program is shown in Figure 1. However, the requirements for a specific system are highly dependent on the life cycle environmental profile (LCEP) and threat hazard assessment (THA) for that system. The LCEP is derived from analyses of the stockpile-to-target sequence to identify the worst-case naturally-occurring and induced environmental conditions that the system will encounter throughout its life cycle, including temperature, humidity, and vibration. Similarly, the THA is an evaluation of the life-cycle of the system to determine the threats and hazards to which the system may be exposed as a result of accidents or deployment in combat. Both the LCEP and the THA are used to establish many of the specific test parameters. Additionally, the THA is used to determine the applicability of each test for a particular system. For example, the shaped charge jet impact and spall impact tests may be applicable for systems that are deployed in ground vehicles, but may not be applicable for systems that are deployed only aboard ships or aircraft.

The following are brief, generalized descriptions of each of the Hazard Assessment Tests defined in MIL-STD-2105. It should be noted that the most recent version of MIL-STD-2105 (Revision C) was released in July 2003. This version introduced several major changes relative to the previous version. One major change is the implementation of NATO Standardization Agreements (STANAGs) as the test protocols for the following tests: 12-meter drop, slow cook-off, fast cook-off, bullet impact, fragment impact, sympathetic detonation, and shaped charge jet impact. Under the NATO STANAGs, the protocols for the bullet impact, fragment impact, and the sympathetic detonation tests differ significantly from those of MIL-STD-2105B. Some of the other changes include the definitions of reaction levels that are used to assess the results of the IM tests, and the passing criteria for the sympathetic detonation test and the shaped charge jet impact test.

28-Day T&H: The items are subjected to cyclic exposure to extreme temperature and humidity conditions. The temperature and humidity conditions are based on the LCEP. Typically, a single cycle consists of 24 hours exposure to the high temperature environment, followed by 24 hours exposure to the low temperature environment. However, the exposure time may be extended to accommodate normal non-working periods, such as weekends and holidays. The minimum duration of the test is 10 full cycles. Thus, if the items are left at the same temperature conditions over a weekend, a total of 28 days are usually required to complete the test. The required instrumentation includes a continuous record of the temperature and humidity conditions in the test chamber(s). After completion of the test, the items are usually examined radiographically and visually to assess their condition. The passing criteria for the test include:

- No reaction of the explosives.

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SPECIAL NOTE TO 74TH SYMPOSIUM ATTENDEES: The 74th S&V Symposium Proceedings will be mailed to the attendees shortly. SAVIAC apologizes for the delay, but felt it necessary in order to include papers that were delayed by the approval process.

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- No exudation containing explosive material.
- Explosives do not crack or separate in a manner that would create a hazardous condition.
- All safety devices remain in the safe position or safe condition.
- The structural integrity of the item(s) is not compromised by corrosion, loosening of joints, or other physical distortions.

Vibration: The items are exposed to the most intense vibration environments that will be encountered during the life-cycle of the system. The modes, levels, and associated durations are derived from the LCEP. Typically the test will include one or more of the transportation and tactical environments addressed in MIL-STD-810, Environmental Engineering Considerations and Laboratory Tests. These environments include random or sine-on-random vibration over the frequency range 5-500 Hz, and in some instances, 5-2000 Hz.

Figure 2. Setup for Vibration Test of 76mm Gun Ammunition

Additionally, for many Navy and Marine Corps systems that are deployed aboard ships, the test will include the shipboard vibration environments addressed in MIL-STD-167, Mechanical Vibrations of Shipboard Equipment. These environments include sinusoidal vibration over the frequency range 4-50 Hz. If appropriate, the test item(s) may be conditioned at high or low temperature while undergoing vibration testing in order to simulate real-world conditions. Typically, the required instrumentation includes accelerometers to control the input vibration and to measure the dynamic response of the test item(s), and thermocouples to measure the temperature of the test item(s). After completion of the test, the items are usually examined radiographically and visually to assess their condition. The passing criteria for the test are the same as those for the 28-day T&H test. The test setup for a vibration test of 76mm gun ammunition is shown in Figure 2.

4-Day T&H: This test is simply a shortened version of the 28-day T&H test. Typically, the test conditions are identical to those used for the 28-day T&H test, except that the duration of the test is 2 complete cycles. The instrumentation requirements and passing criteria are identical to those for the 28-day T&H test.

12-Meter Drop: The test item is dropped free-fall from a height of 12 meters onto a 3-in thick (minimum) steel plate that is supported by a base of reinforced concrete or crushed stone. Typically 3 items are tested, as follows:

(1) 1 item impacting with its major axis oriented horizontally
(2) 1 item impacting with its major axis vertical, forward end down
(3) 1 item impacting with its major axis vertical, forward end up

The tolerance on the orientation at impact is ±10°. If required, some means must be provided to ensure impact in the required orientation; however, the method used should not reduce the impact velocity significantly. The only required instrumentation for the test is video or motion picture coverage of the event. However, in some instances, the test item(s) may be instrumented with accelerometers and/or strain gages to measure dynamic response and structural loads. The test item(s) are examined visually and, in some instances, radiographically after the test to assess the effects of the test. The passing criteria are:

Figure 3. Setup for 12-Meter Drop Test of a Missile

- No reaction of the explosives.
- No rupture of the test item that dislodges or disrupts the explosives.
- The item(s) must be safe to handle for subsequent disposal using normal procedures.
- All safety devices remain in a safe condition.

Figure 3 shows an encanistered missile suspended above the steel plate immediately before release. The structure directly below the missile is a containment cage that is designed to restrain the missile, in the event that the impact causes the rocket motor to ignite and burn propulsively.

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* Modern Protective Structures *
July 12-16, 2004

A Penn State Engineering short course for engineers, architects, and safety and security managers

Catastrophic events such as the embassy bombings in Kenya and Tanzania, the destruction of the federal building in Oklahoma City, the attacks on the World Trade Center and the Pentagon, blasts in London's financial district, and explosions in petrochemical plants are becoming all-too-frequent occurrences. In today's world, knowledge of modern protective structures is vital.

The course gives engineers, architects, and safety and security managers practical background information relating to the performance and design requirements for hardened facilities. Comprehensive reviews and advanced research and development topics are designed to augment the technical capabilities of hardening and forensic engineers and scientists. In addition, a review of Blast Damage Assessment (BDA) issues provides forensic and rescue personnel with additional background information.

Additional features:

- Hands-on guided analysis and design activities
- Case-study, problem-solving approach
- Simulations and projects
- One-on-one contact with instructors for individual assistance
- Open computer lab sessions for extended analysis and problem solving

Take-aways:

- Computer disk with programs for analysis and design of protective structures
- Extensive design manual and reference materials

You will examine these topics:

- Fortification science and technology
- Analysis, design, assessment, and retrofit
- Industrial explosive safety
- Antiterrorist design
- Hazard sources
- Physical security
- Blast damage assessment

About the Instructor:

Dr. Theodor Krauthammer, Penn State professor of civil engineering and director of the University's Protective Technology Center, is an internationally recognized researcher in enhanced structural performance and safety and has more than thirty years of experience in protective structures. He has served as a technical consultant to government and industry in the United States and abroad and is the former chairman of the American Concrete Institute (ACI) Committee 370 on Short Duration Dynamics and Vibratory Load Effects, a member of five technical committees of ACI, a member of the American Society of Civil Engineers (ASCE) Task Committee on Structural Design for Physical Security, and a member of the ASCE Committee on Shock and Vibratory Effects.

Continuing Education

Penn State is a Registered Provider with the AIA Continuing Education System. This program qualifies for 32 hours of Health, Safety, Welfare (HSW).

Fee and Registration

The fee covers all instruction, course materials, refreshment breaks, and lunches. Registrants are responsible for all other meals and lodging. The fee may be paid by check, money order, or purchase order (made payable to Penn State), or by major credit card (American Express, MasterCard, VISA, or Discover). An additional charge of $30 will be added to all walk-in registrations.

To register, go to http://www.cde.psu.edu/C&I/protectivestructures/ and complete the printable registration form, and return with fee to Penn State by June 24, 2002. Or complete and submit the online registration form. Fax registrations must be accompanied by credit card payment information. You may also register with your credit card by calling 814-863-5162 or 800-PSU-TODAY (778-8632; toll free within the United States). You will be notified promptly of any cancellations or schedule or program changes. Conferences and Institutes will confirm your enrollment in the program and
provide information on travel, accommodations, final registration, and parking.

Refunds

All cancellations must be received in writing by mail or fax. Full refunds will be made for cancellations received by June 21, 2002. Refund requests made after that time will not be honored, and the participant or sponsoring organization is responsible for the fee. Anyone who is registered but cannot attend may send a substitute.

University Policies

Access--Penn State encourages individuals with disabilities to participate in its programs and activities. If you anticipate needing special accommodations or have questions about the physical access provided, please contact the conference planner at 814-863-5100 before your visit.

Cancellation--The University may cancel or postpone any course or activity because of insufficient enrollment or other unforeseen circumstances. If a program is canceled or postponed, the University will refund registration fees but cannot be held responsible for any other related costs, charges, or expenses, including cancellation/change charges assessed by airlines or travel agencies.

For More Information

About registration

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Fast Cook-Off: The test item is suspended over a basin that contains burning liquid hydrocarbon fuel, such as JP-5, Jet A-1, or kerosene. The size of the basin and the quantity of fuel used should be sufficient to ensure complete engulfment of the test item until all of the explosive components have reacted. The required instrumentation includes thermocouples to measure the flame temperatures, video or motion picture cameras to record the test events, and airblast gages. Thermal flux gages are also required for tests of items that are candidates for HD 1.3 or HD 1.4 hazard classification. After the test, the site is searched to recover the remains of the test item(s). The condition and location of the test item remains are critical considerations in evaluating the test results. The passing criterion is no response more severe than a Type V response, as defined in Allied Ordnance Publication AOP-39. Essentially, this means that the effects of the test item reaction(s) should be limited to the region within 15 meters of the item(s), and that any debris ejected from the item(s) would be unlikely to cause fatal wounds. Figure 4 shows a fast cook-off test in-progress.

Slow Cook-Off: The test item is subjected to continuous heating within an expendable oven until all of the explosives have reacted, or until the reaction of the test item renders the oven inoperable. Typically the heating rate is 6° per hour; however, other heating rates may be used, if supported by the THA. Careful consideration should be given to the design of the oven to ensure that it is capable of permitting completion of the test, yet has a minimum effect on the ejection of debris from the test item during the reaction(s). The required instrumentation includes thermocouples to measure the temperatures within the oven and on the surface of the test item, and video coverage of the test events. Like the fast cook-off test, the site is searched after the test to recover the remains of the test item, since the condition and location of these remains are critical considerations in evaluating the test results. The passing criterion for the test is also no response more severe than Type V.

Bullet Impact: The test item is impacted by 3 (maximum) 50-caliber armor-piercing bullets that are fired at normal service velocity (~2800 ft/s). The bullets are fired sequentially at 100-millisecond intervals to simulate a weapon firing rate of 600 rounds per minute. The test may be conducted using either a single gun capable of firing at the required rate, or by using 3 separate guns capable of firing a single round. If multiple guns are used, they should be aimed at a common point on the test item. Typically, 2 items are tested, as follows:

- One item is impacted through the largest explosive component, such as the main charge of a warhead or the propellant grain of a rocket motor.
- One item is impacted through the most shock-sensitive component, excluding the booster.

If the test is intended to address Hazard Classification requirements also, an additional test firing may be required with the bullets aimed to impact the booster. Instrumentation requirements include measurement of gun firing times and bullet velocities, airblast gages, and high-speed video or motion picture coverage of the test events. As with the cook-off tests, the post-test condition and location of the test items remains are critical considerations in evaluating the test results. The passing criterion for this test is also no response more severe than Type V.

Fragment Impact: The test item is impacted at high velocity by a single fragment simulator. The fragment simulator is a 9/16-in diameter right circular cylinder that has a conical tip. The standard velocity is 8300 ft/s, although an alternative velocity may be used if supported by the THA. At NSWCDD, the fragment simulator is launched using a specially modified smoothbore 60mm gun. Typically, 2 items are test-

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Figure 4. Fast Cook-Off Test

Exhibit at the 75th Shock & Vibration Symposium

2004 Exhibitor Prospectuses are now available for the 75th Shock & Vibration Symposium. The Symposium will be held at The Cavalier Hotel in Virginia Beach, VA, October 17-22, 2004. E-mail Lauren Yancey at lauren.yancey@saviac.org to reserve your space!

ed in a manner analogous to the bullet impact test; i.e., one item is impacted through the largest explosive component, and the other item is impacted in the most shock-sensitive region. Instrumentation requirements include measurement of the fragment simulator's velocity and high-speed video or motion picture coverage of the test events. Airblast gages are also frequently used to determine if the test item reaction(s) create significant overpressure. As with the cook-off and bullet impact tests, the post-test condition and location of the test item remains are critical considerations in evaluating the test results. The passing criterion for this test is also no response more severe than Type V. Figure 5 shows a fragment impact test of a missile warhead. The 60mm gun is visible in the left side of the picture.

Figure 5. Fragment Impact Test

Sympathetic Detonation: Multiple items are arranged to simulate a storage condition that may be employed during the logistics life-cycle. One item, referred to as the donor, is then functioned to determine if the reaction will propagate to the adjacent items, which are referred to as acceptors. The arrangement of the test items is based on the THA, and is usually selected to simulate the worst-case credible conditions. For items that are designed to detonate, such as warheads, the donor is initiated in its design mode. For other items, such as rocket motors or artillery propelling charges, the donor is initiated in a manner that will produce the maximum credible event. The test is usually performed twice: once with additional external confinement, such as sand-filled containers, placed around the test items; and once without any additional confinement. The only required instrumentation is high-speed video or motion picture coverage of the test events, although airblast gages may also be used in some instances. The passing criterion is that none of the acceptors shall produce a Type I or Type II response, as defined in AOP-39. Essentially, this means there can be no detonation of any of the explosives or energetic materials in the acceptors.

Shaped Charge Jet Impact: Typically, the item is impacted by the shaped charge jet of a Rockeye submunition. However, an alternative shaped charge device may be used if supported by the THA. The impact point on the test item and its orientation relative to the shaped charge are based on the THA. No instrumentation is required. However, the test setup will typically include witness plates and high-speed digital video or motion picture cameras to aid in the evaluation of the test results. The passing criterion is that the response of the test item may not be Type I or Type II.

Spall Impact: An 81mm precision shaped charge warhead is fired through a 1-in thick steel plate, with the test item located on the backside of the plate. The test item is positioned so that it lies within the spray pattern of the spall fragments, but is not impacted directly by the shaped charge jet after it exits the plate. The required area density of spall impacts on the surface of the test item is 4 fragments per 10 in^2. The only required instrumentation is video or motion picture coverage of the test events. The passing criterion is no sustained burning of the test item.

In summary, the Hazard Assessment Tests of MIL-STD-2105 are a key element of the system safety program for most explosive munitions. However, the system safety test program will also include other commodity-specific, system-specific, and/or Service-specific tests that are not addressed in MIL-STD-2105. Examples of these other tests might include the various safety tests defined in MIL-STD-1316 for fuzes or the shock test requirements of MIL-S-901 for systems deployed aboard Navy ships. Additionally, with proper planning, there may be opportunities to tailor the Hazard Assessment Test program to address other system safety requirements, such as Final Hazard Classification and Explosive Ordnance Disposal procedures. Thus, in all cases, it is recommended that the acquisition agent work closely with the appropriate system safety and Service review organization(s) to develop a comprehensive, rational system safety test program.

Explosion Effects and Structural Design for Blast

A 2-day Training Course
At the Embassy Suites Hotel at
Baltimore/Washington International Airport
August 13 - 14, 2004

Instructors: Dr. Sam A. Kiger, PE and Dr. Stan Woodson, PE

Engineers have an opportunity to improve their skills in understanding explosion effects and designing facilities that are safer to occupants by understanding and minimizing the effects of explosive detonations on structures. Architects and builders will also benefit by appreciating the impact of explosive design decisions early in the process. All new government buildings now require some level of blast resistant design and this training will specifically address those requirements.

Course Description:

This 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 discussed and demonstrated. Much of the design guidance and software is restricted distribution to government agencies and their contractors, however specific information on how to use and obtain the software will be covered in the course. The participant will gain an understanding of how to compute blast loads 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 with a complete set of class notes. A general background in structural analysis and structural design will be assumed.

Primary Topics Include:

Explosion Effects, Loads on Structures, Behavior of Structural Elements, Structural Dynamics, Response Calculations (approximate methods and computer codes), and Retrofit Techniques.

Course Location:

The course will be held at the Embassy Suites at Baltimore/Washington International Airport. A block of rooms are being held until July 12 at the reduced rate of $109 per night. For reservations, call 1-800-EMBASSY and request the special room rate for “Explosion Effects Design Class”.

Course Registration:

Registration Fee is $895.00. Your payment, in full, must accompany your registration form.

Course Refund Policy:

Refund of registration fee, less $50 to cover processing costs, are available upon cancellation notice by the registrant. Notification will be by fax, dated and signed by the person registered, to Dr. Sam Kiger at 573-882-4784. The refund will be by check mailed, within 30 days, to the registrant at the address requested on the fax. No refund will be allowed after five working days before the day the course begins. In the event the course is canceled a full refund will be paid to the individual at the address given at the time of registration. Questions may be directed to Dr. Sam Kiger at kigers@missouri.edu or by calling 573-882-3285.

More information about the instructors, the course, and accommodations can be found at http://blastdesigntraining.com. Professional engineers will get continuing education credit of 15 PDH's for the course. On-line registration is available and will ensure your seat is reserved. Questions regarding content and appropriateness can be obtained by contacting Dr. Sam Kiger at 573-882-3285, KigerS@missouri.edu or Stan Woodson at 601-636-4429, WoodsonEng@direcway.com.

Call For Papers

75th Shock and Vibration Symposium
October 17-22, 2004
The Cavalier
Virginia Beach, VA

Planning for the 75th Shock and Vibration Symposium is underway. NSWC/Dahlgren Division is the Government Featured Organization and Northrop Grumman Newport News and PCB Piezotronics are the Commercial Featured Organizations. The Cavalier Hotel in Virginia Beach is the location.

The Shock & Vibration Symposium is the oldest continuously held meeting 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.

Presentations in the following subject areas are welcomed:

901D Case Studies
Active Vibration Control
Air Blast
Anti-Terrorist Technologies
Ballistic Shock
Biodynamics
Blast Design
Blast Effects
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
Homeland Defense
Impact/Penetration Mechanics
Infrastructure Protection
Instrumentation
Isolation Systems
Large Structures
Live Fire Testing
Machinery Diagnostics
Machinery Vibration
Material Dynamic Properties
Modal Analysis and Testing
Product Announcement/Facility Description
Pyrotechnic Shock
Seismic Shock
Shock Characterization
Shock Hardening
Shock Qualification by Extension
Shock Response Spectrum
Shock Test/Equipment Failure Modes
Simulation Methods
Specifications and Standards
Structural Hardening
System Identification
Test Criteria
Test Tailoring
Underwater Shock Testing
Vibroacoustics

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 3, 2004. You are encouraged to submit online at www.saviac.org, click on 75th 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 16, 2004. The full paper presentations must meet the following standards: They must be previously unpublished and unpresented, 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 is October 8, 2004.
Questions should be directed to Joel Leifer, 301.596.0100 or joel.leifer@saviac.org.

INDUSTRY NEWS

New Environmental Protection for Outdoor Measuring Microphones

Columbia, MD - Scantek, Inc. now offers a new device that can be used with many outdoor measuring microphones to provide protection from the elements. The Norsonic N-1212 Environmental Protector for microphones allows standard measuring microphones/preamplifiers to be used in all weather conditions. The electrically insulated enclosure protects the microphone from both rain and dust using an innovative design. Its shape assures both appropriate directional characteristics and prevention of perching birds. The enclosure can allow mounting on any standard tripod, protecting the microphone from dust, rain, snow, and wind. The device is a cost-effective way to do Type 1 or Type 2 measurements using microphones usually reserved for fair-weather conditions. Further, the simple design requires no special adaptors for field-checking the sensitivity of the microphone. For more information, call (800) 224-3813 or visit www.scantek-inc.com.

Endevco Technical Papers and Dynamic Instrumentation Book Available for Download

SAN JUAN CAPISTRANO, CA - Professional Development Book, "*Authoritative Reference for Dynamic Measurement Professionals*". Information contained in the handbook provides a competitive edge for companies that design or are dependent on measurement systems for test or control applications. The handbook explains in detail the factors associated with various measurement system considerations. Visit http://www.endevco.com/about-newsitems/121103dynamichandbook.php for more detailed information.

Technical Papers, "Model 7270A Shock Accelerometer Installation Tips," "Acceleration Levels Of Dropped Objects," and "Thermal Isolation of Accelerometers." These papers represents the "technical know-how" for which ENDEVCO has become internationally recognized as the leader in the design, manufacture and distribution of piezoelectric, piezoresistive and variable capacitance transducers and related instrumentation. The knowledge in many of these 30+ years old documents is timeless. Visit http://www.endevco.com/resources/techpapers.php for these and more papers available through Endevco.

Visit Endevco at Sensors Expo (Booth # 326) to discuss your sensing needs with their engineers, product managers and sales engineers. Call 949.443.9300 to arrange a specific date and time that you want to meet with Endevco engineers at this show to review your application needs.

Data Translation Announces DSP Control-Loop System Solution

MARLBORO, MA - Data Translation®, Inc. announced a new high-speed data acquisition board that transforms a PC into a closed-loop platform for test and control applications. The DT9842 is the latest offering in the DSP Fulcrum® II Series of data acquisition boards.

The DT9842 board leverages the portability of the PC. Control-loop testing can involve machinery of immense size such as generators and vibration systems. Until now, test stands were static, requiring the test stand to be delivered to the equipment under test. Users can now simply wheel the PC to the equipment and take measurements.

The DT9842 is a single 6U board with standard connections for analog input, analog output, trigger and clock. Up to eight boards can be added via a LVDS communication port to expand channel count up to 64 simultaneous A/D input signals plus 64 D/A output signals. The board is also available in a Sleek Box™ version that includes the board in a CE-compliant box with standard connectors, a USB 2.0 cable, power supply and fan.

To learn more about TI's real-time eXpressDSP™ Software and Development Tools and receive free evaluation tools, visit www.dspvillage.ti.com/ordercd7.

Extended Simulation Capabilities Accelerate Performance Engineering Throughout Product Development

Leuven, Belgium - LMS International announced the availability of Rev 4 of LMS Virtual.Lab, its award-winning simulation environment for functional performance engineering. LMS Virtual.Lab offers an integrated software suite to simulate the performance of mechanical systems on attributes such as structural integrity, comfort, sound quality, system dynamics, handling and durability. Rev 4 introduces a new LMS Virtual.Lab Morphing module that enables users to quickly modify existing Finite Element (FE) models into new models and to perform a multitude of analyses before complete CAD or new FE models become available. LMS Virtual.Lab Rev 4 also increases the performance and capability of all its integrated simulation applications, including Motion, Noise and Vibration, Interior and Exterior Acoustics, and Durability. New post-processing and optimization enhancements allow gaining deeper insights faster, and retrieve the best-suited design options in the most efficient way.

With the introduction of LMS Virtual.lab Rev 4, LMS continues to add new functionality and to extend the application reach of LMS Virtual.Lab. The LMS Virtual.Lab Structural Analysis configuration provides users of Finite Element Analysis (FEA) tools, like CATIA CAE, MSC.NASTRAN or ANSYS, extended FE manipulation tools and pre-/post-processing capabilities for numerous types of FE analyses. LMS Virtual.Lab transparently accesses the modeling and results data, and makes the structural solver an integral part of the Virtual.Lab simulation process.

For more information on LMS Virtual.Lab, visit www.lmsvirtuallab.com.

Conference and Short Course Announcements

Be sure to check www.saviac.org for more information on upcoming events.

NOISE-CON 2004
Institute of Noise Control Engineering of the USA
Baltimore, MD
July 12-14, 2004

The Institute of Noise Control Engineering of the USA (INCE/USA) holds a meeting every year. Noise-Con04 will be the 20th in the series of national conferences. This year, INCE/USA and A1F04 will be meeting together at the Wyndham Inner Harbor Hotel in Baltimore, Maryland, on 12–14 July 2004. This joint Noise-Con04/TRB A1F04 meeting will consist of technical sessions on all aspects of noise control engineering with an emphasis on transportation noise; receptions and socials, including a dinner cruise of the Baltimore Harbor; and an exposition of measurement instrumentation and noise and vibration control products.

Conference proceedings will be published on a CD-ROM that will be part of the package received at the conference by each attendee. Submission of papers for INCE technical sessions will be required. It will be left as an option for participants from TRB A1F04 to submit a paper for publication in the conference proceedings. For more information and to register please visit http://www.inceusa.org/.

2004 ASME Pressure Vessels and Piping Conference
American Society of Mechanical Engineers
San Diego, CA
July 25-29, 2004

More than 150 paper and panel sessions are planned, as well as tutorials, NDE and Software demonstrations, and the Student Paper Competition. The PVP Conference is a great place to present your ideas and to meet colleagues as ASME works to create and advance PVP technologies in addressing present and emerging challenges in our industry. The ASME Pressure Vessels and Piping Division will sponsor this Conference with co-sponsorship of the Japanese Society of Mechanical Engineers (JSME), and with participation by the ASME NDE and ASME Pipeline Systems Divisions.

General topics include: (1) Codes and Standards, (2) Computer Technology, (3) Design & Analysis, (4) Fluid-Structure Interaction, (5) High Pressure Technology, (6) Materials & Fabrication, (7) Operations, Applications, & Components, (8) Seismic Engineering, (9)Nondestructive Examination, (10) Pipeline Systems, and (11) Student Paper Competition. Abstracts are due by September 30, 2003. Authors will be notified of abstract acceptance by October 15, 2003. Draft papers are due by November 30, 2003. Paper peer review comments will be returned by January 31, 2004. Final papers in ASME format for publication must be received by March 1, 2004. All accepted papers will be published in Conference Volumes.

AIAA Modeling & Simulation Technologies Conference and 22nd Applied Aerodynamics Conference and Exhibit
AIAA
Providence, Rhode Island
August 16-19, 2004

Each year, the Modeling and Simulation Technologies (MST) Conference brings together the foremost authorities on aircraft and spacecraft simulation from around the world. The state of the industry is examined and evaluated through the presentation of technologies mastered, lessons learned, problems posed, and projects successfully completed. As simulation becomes more and more an integral part of all phases of air and space vehicle construction and operation, from the traditional bailiwick of training to emerging applications in acquisition, the importance of the MST conference to the advancement of aerospace technology continues to grow. The conference program for 2004 includes over 100 technical papers, populating 20 different sessions. This year's presentations continue the tradition of addressing widely varying aspects of modeling and simulation, from the now-prevalent utilization of low-cost components for high-quality simulation to the ongoing efforts to establish industry-wide standards for simulation data interchange. In addition to the traditional technical paper sessions, several workshops and special sessions are featured. Each workshop promises to provide new insights into a designated topic through discussions among the invited panel members and the audience. This year, no MST paper sessions have been scheduled against the workshops, in an effort to allow and to encourage across-the-board participation in these important discussions. As a new initiative for this year, a special session consisting of hour-long tutorials will be presented. Each tutorial will provide attendees with an in-depth understanding of an emerging or

Make sure your events get into the 2005 SAVIAC Calendar!

The 2005 SAVIAC Calendar is being compiled for distribution among the 75th Shock & Vibration Symposium attendees, as well as hundreds of other SAVIAC community members around the globe! Don't miss your opportunity to have your event placed in our calendar. Contact Lauren Yancey with your event dates and details at *lauren.yancey@saviac.org.*

established technology in modeling and simulation, beginning from first principles. In recognition of the 75th anniversary of the Link trainer, an invited session covering the History of Simulation is also presented, and is certain to be compelling and entertaining.

Countless opportunities exist at the 2004 MST Conference to increase one's understanding of our chosen field and to aid in the advancement of it. Your conference chairs trust that you will find this year's conference to be of great use to you in the advancement and enrichment of your own career in modeling and simulation.

The 22nd AIAA Applied Aerodynamics Conference features invited and regular sessions that address the development, validation, and verification of analytical and computational tools applied to aerospace vehicles and new techniques/methodologies for the wind tunnel and field testing. The program also includes sessions on Aerodynamics-Structural Dynamics Interactions, Unsteady Aerodynamics, Vortex Dynamics, UAV, Rotorcraft, Flow Control, a combined session on Wind Tunnel and Flight Testing, and an invited session on Complex Missile Configurations.

Process For Designing and Assessing Shock Mounted Systems using the 6 DOF Shock Isolation Mount Prediction and Loading Estimate (SIMPLE) Software
September 10, 2004, 9:00am to 4:00pm
Norfolk, VA
This course will provide a process for designing and assessing shock mounted systems with special emphasis on applications related to the design of ship structures and equipment for shock loads produced by underwater explosions utilizing the analytical software tool "Shock Isolation Mount Prediction And Loading Estimate" (SIMPLE). Copies of the SIMPLE software are available free to anyone and may be downloaded at http://users.erols.com/michael-talley/. The course will be presented by Dr. Michael A. Talley of Shock Analysis & Testing, Michael-Talley@erols.com, and Bob Krezel of ROG Consulting, Bob_Krezel@hotmail.com

The registration fee is $500, which includes the cost of all sessions, related course information, continental breakfast, coffee breaks, and lunch. A CD with the SIMPLE software will be provided. Early registration is suggested because enrollment is limited. Please send email or phone call requesting a registration form from Bob Krezel, (757) 484 8387, (bob_krezel@hotmail.com). Registration should be completed by 27 August 2004. Each participant should bring a laptop computer having Windows 95 or higher and a CD or Zip drive.

Practical Shock Analysis & Design Short Course
MFPT Society
September 27-October 1, 2004
Virginia Beach, VA

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. For more information and to download the registration form, visit http://www.saviac.org/Shock%20Course.htm.

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In the June 2004 Current Awareness Newsletter

Hazard Assessment Tests of Explosive Munitions Under MIL-STD-2105
Mel Baron Award
Modern Protective Structures Course
Explosion Effects and Structural Design for Blast Course
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