SAVIAC
Shock and Vibration Information Analysis Center
Current Awareness
November 2005
HAPPY THANKSGIVING!

# 76th Shock & Vibration Symposium Highlights

Great weather, industry experts, a full program, and lots of attendees combined to make the 76th Shock & Vibration Symposium a huge success. The Symposium, featuring the US Army Engineer Research and Development Center, the Defense Threat Reduction Agency, Weidlinger Associates, Inc. and MSC.Software, was held at the Hilton Sandestin in Destin, FL on October 30 - November 3, 2005. 461 attendees listened to 196 papers in 18 unclassified, 4 training, 12 limited and 5 confidential/secret sessions. There was also one panel, 4 discussion groups, the Shock Response Spectrum and Education Committee meetings, 3 standards working group meetings, and the New Engineer's Forum. There were 21 tutorials on Sunday/Monday for those arriving early to maximize the educational opportunities provided.

The classified sessions were held at facilities provided by NSWC Dahlgren Division Coastal Systems Station at Panama City, FL. Due to the distance, the limited sessions were held at the hotel and the confidential/secret sessions were grouped and held on Thursday afternoon on Panama City. SAVIAC would like to thank Mr. Jeff Blankenship of NSWC Coastal Systems Station, and Ms. Linda McGowan and Ms. Mary Hallberg of the US Army Engineer Research & Development Center for their excellent work in providing security for the classified sessions.

## Nominations for Henry Pusey Award

The Henry Pusey Award is presented annually at the Opening Session of the Shock & Vibration Symposium to the author of the best paper from the previous Symposium. Nominations are from the attendees at the Symposium based on the presentation or from the proceedings. The following nominations have been received to date: "A Study of the Effects of Casing Material Properties on the Airblast from Cased Explosive Charges", Dr. Alan Ohrt, AFRL and Dr. Seung Lee, DTRA, "Littoral Environment Modeling of UNDEX and Air Blast Events", Graeme Birkhead, John McVee, QinetiQ, "Using Work and Energy Methods to Characterize Mechanical Shock", Timothy Edwards, Sandia, "The Accelerometer Cable - It Can't Get No Respect", Prof Patrick Walter, PCB Piezotronics/TCU, "New Developments in Shipboard Vibration", Chuck Vallance, Raytheon, "Targeting Considerations (VNTX Overview), Charles Deel, SAIC. To be eligible to receive the award, a written paper must be submitted for publication in the proceedings.

Dr. James Houston delivered the keynote address to the attendees of the Symposium.

The opening session was brought to order Tuesday morning by Joel Leifer, the SAVIAC Program Manager. The attendees were welcomed by Dr. Bob Welch, SAVIAC Director and Chief, Engineer and Informatics Systems Division, US Army Engineer Research and Development Center, Dr. Ray Daddazio, Director, Applied Sciences Division, Weidlinger Associates, and Mr. Gene Allen, Director of Collaborative Development, MSC.Software.

The Program Committee Co-Chairs presented the Henry Pusey Award for best paper presented at the 75th Shock & Vibration Symposium to Mr. Timothy Edwards of Sandia National Laboratories for his paper "Effects of Aliasing on Numerical Integration". Tim is the first person to receive the award twice, having received the award in 2002 while working at NSWC/DD. Mr. Bob Bowser of NAVSEA 05P3 presented Lifetime Achievement Awards to Dr. Rudy Scavuzzo, Mr. Robert Bort, and Mr. Bill Forehand. After the conclusion of the Opening Session, a lunch was held to honor the three recipients.

This year, those who gave of their time, effort, and talents throughout the year were recognized by SAVIAC with the Director's Award by Mr. Joel Leifer, SAVIAC Program Manager. Dr. Bob Welch & Dr. Paul Mlakar, Army Research & Development Center, Dr. David K. Vaughan, Weidlinger Associates, Mr. Patrick Lindsey, USACE Protective Design Center, Dr. Eric Rinehart, Defense Threat Reduction Agency, Mr. Bart Mcpheeters, MSC.Software, Mr. Allen Parkes, Naval Surface Warfare Center, Crane Division, Mr. Tim Edwards, Sandia National Labs, Ms Susan Blaeser, Acoustical Society of America, Mr. Greg Harris, Warfare Center, Indian Head Division, and Mr. Bob Krezel, Consultant, volunteered to be instructors at the Winter Shock & Vibration Seminar held in New York, NY in February of 2005. Dr. Bob Welch & Dr. Paul Mlakar, US Army Research & Development Center, Dr. Ray Daddazio & Ms Margaret Tang,

***Symposium*, continued on page 3**

# Explosion Effects and Structural Design for Blast

## A 2-day Training Course
## At the Hilton Garden Inn Virginia Beach Town Center
## Virginia Beach, VA
## February 22 and 23, 2006

### 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 Hilton Garden Inn Virigina Beach Town Center in Virginia Beach, VA. Room reservations can be made through Hilton Garden Inn Central Reservations Line at 1-877-STAY-HGI or 1-877-782-9444 (mention the explosion effects training to get a reduced rate of $62 per night). A block of rooms will be held for the course until 02/01/2006.

**Course Registration:**

Registration Fee is $895.00 (Includes lunch each day). 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://www.blastdesigntraining.com. This is the fifth offering of this popular course and previous offerings have been full to capacity; so register early to ensure your place is reserved. Secure on-line registration is available. Questions should be directed to Dr. Sam Kiger at 573-882-3285, KigerS@missouri.edu or Stan Woodson at 601-636-4429, WoodsonEng@netzero.net.

*Symposium*, continued from page 1 Weidlinger Associates, Mr. Tim Edwards, Sandia National Labs, Prof Sam Kiger, University of Missouri, Mr. Bart Mcpheeters, MSC.Software, Mr. Jeff Morris, HI-TEST Labs, Dr. Rudy Scavuzzo, University of Akron, Mr. Bence I. Gerber, Century Dynamics, volunteered to be instructors at the Summer Shock & Vibration Seminar, held in New Orleans, LA in June of 2005.

Mr. Richard Peppin, Scantek, Mr. Ahid Nashif, Consultant to UTC, Mr. James Jennings, Naval Surface Warfare Center Carderock Division volunteered to lead our discussion groups at the Symposium this year. Mr. Roger Bagbey, Anteon, Dr. Ray Daddazio, Weidlinger Associates, Mr. Ami Frydman, US Army Research Lab, Dr. John Henderson, UTC, Dr. G. Will McMahon & Ms Yazmin Seda-Sanabria, US Army Research & Development Center, Dr. E. Thomas Moyer, Mr. Sean, & Mr. Joel Myers, Northrop Grumman Ship Systems, Dr. Eugene Sevin, Consultant, Ms Margaret Tang, Weidlinger Associates, Mr. Scott Walton, US Army Research Lab, Mr. Robert Wunderlick, NSWC Carderock Division volunteered to develop special sessions.

Mr. Richard Peppin, Scantek, Dr. Howard Gaberson, Consultant, Mr. Scott Walton, US Army Research Lab, Dr. Rudy Scavuzzo, University of Akron, Dr. Tom Paez, Sandia National Labs, Mr. Edward Dyer, BAE Systems, Dr. Joseph Koester, USAERDC, Mr. Mathew Macias, MSC.Software, Mr. Gene Allen, MSC.Software, Mr. Bart Mcpheeters, MSC.Software, Mr. Andy Anderson, BAE Systems volunteered to be instructors for this year's Training Session Track.

Mr. Tim Edwards, Sandia National Labs, Mr. Andy Anderson, BAE Systems for chairing the two SAVIAC committees. Mr. Pete Loeffler, NSWC Carderock Division, Mr. Don Dusenberry, Simpson, Gumpertz & Hegner, Mr. Tony Abbey, Noran Engineering, Dr. Jeff Cipolla, ABAQUS, Mr. Randy Patrick, Yuma Proving Grounds for chairing special meetings. Mr Austin Alvarez, Electric Boat and Prof Sam Kiger, University of Missouri for their presentations at the New Engineer's Forum.

General Dynamics Electric Boat Corporation, HI-TEST Laboratories, and PCB Piezotronics, were recognized for their Gold-Level Support for 2005. Weidlinger Associates was recognized for its Silver Level Support for the year. National Technical Systems was recognized for their contribution to the Winter and Summer Shock & Vibration Seminars for 2005. Thanks to the generous support of these organizations, SAVIAC can continue to provide educational opportunities and respond to requests for assistance from the community.

Dr. Bob Welch, USAERDC & SAVIAC Director, recognized this year's block funding agencies: Air Force Research Laboratory Munitions Directorate, Army Redstone Technical Test Center, Defense Threat Reduction Agency Kirtland, Engineer Research & Development Center - GSL, Engineer Research & Development Center - ITL, Idaho National Lab, NUWC Keyport, NSWC Carderock, NSWC Crane, NSWC Dahlgren, Sandia National Laboratories, and US Army Research Laboratory.

(l-r) Program Committe Co-Chairs Adam Hapij, Richard Lewis, Bart Mcpheeters present the Henry Pusey Award to Timothy Edwards

The Keynote Address was delivered by Dr. James Houston, Director, USAERDC, who spoke on the need to encourage young people to explore careers in the sciences. Engineering graduates are in demand in other industries such as finance and the foreign students are returning to their native lands so that this country faces a shortage of talent in the coming years. This resonated with the attendees who had follow-up discussions on the subject in the Open TAG meeting on Wednesday night. The transcript and vu-graphs will be on the Proceedings CD and on the SAVIAC web site.

Dr. Edwin Fasanella delivered the Elias Klein Lecture where he talked about the ”Space Shuttle Orbiter Debris Impact Studies - the Behavior of “Soft” Foam at Ballistic Velocities”.

This year's Guest Program was again a huge success, and incorporated 3 days of activities, raising the program to new heights. Mrs. Boo Perkins coordinated the program this year, and a generous donation from Electric Boat helped to defray the cost for the participants. On Tuesday afternoon, guests spent their day touring and shopping in historic Seaside with the cost of the bus transportation, $10/person, donated to the Red Cross for hurricane relief. A total of $200 was raised. Wednesday, the group shopped at the outlets. Thursday, the group spent the morning at the hotel spa.

Wednesday night's social event was well attended with over 400 people enjoying a buffet on the deck. The hotel provided a host for a game of trivia with prizes donated by HI-Test Labs, MSC.Software, Spectral Dynamics, and PCB Piezotronics. Many thanks. Afterward there was a bonfire and beach volleyball.

Please don't forget to look for the proceedings of the 76th Symposium, published on CD-ROM and available through SAVIAC in 2006. Each attendee will automatically receive a copy of the proceedings.

# New Engineer's Forum Debuts at S&V Symposium

Ms. Margaret Tang of Weidlinger Associates chaired our first New Engineers Forum which featured presentations by Mr. Austin Alvarez of General Dynamics Electric Boat on Submarine Construction and Prof Sam Kiger of University of Missouri on Designing a Building for Blast. Mr. Alvarez keynoted the meeting with a presentation on the importance of developing a career path and the value of networking. Mr. Joel Leifer filled in for Mr. Bob Krezel to talk about the Mentor Program that SAVIAC is sponsoring. Ms. Tang then opened the forum to discussion among the attendees. The comments identified a need for basic instruction in order to derive a greater benefit when attending the Symposium. Some specific suggestions were to set aside a part of the SAVIAC web site for discussion about common lessons learned by new engineers, rules of thumb, and "back of the envelope" type solutions, as well as sharing small software tools used in solving these types of problems. In addition, it was suggested that SAVIAC could expand on the "S&V from A to Z" presentation by Dan Worth of NASA/Goddard. One suggestion that SAVIAC will implement at the next Symposium is a separate track for training on product usage. SAVIAC has contacted a number of vendors about scheduling 30-60 minute sessions where there will be hands on demonstrations of their products. Jon Wilson, The Dynamic Consultant, has been approached to coordinate this effort. In the excitement of the event, no one circulated a sign-up sheet. If you attended or are interested in helping to develop next year's forum, please contact Joel Leifer, joel.leifer@saviac.org or Margaret Tang, tang@wai.com.

# Free Winter Shock & Vibration Seminar

SAVIAC invites you to attend a FREE seminar on Shock & Vibration. The course will be held on February 15, 2005 at the Doubletree Grand Key Resort in Key West, FL in conjunction with the SAVIAC Winter Technical Advisory Group (TAG) Meeting. SAVIAC and the featured experts in their disciplines have organized this seminar to introduce you to the SAVIAC community, while providing a valuable educational experience.

## Agenda

| | | |
|---|---|---|
| 8:00 - 8:25 | Registration & Continental Breakfast | |
| 8:25 - 8:30 | Welcome | Dr. Bob Welch, SAVIAC Director |
| 8:30 - 8:45 | Introduction to SAVIAC | Joel Leifer, SAVIAC |
| 8:45 - 9:15 | Introduction to Shock & Vibration | Joel Leifer, SAVIAC |
| 9:15 - 9:45 | TBD | |
| 9:45 - 10:15 | Explosion Effects in Air, Water, and Soil | Dr. Bob Welch, SAVIAC/ERDC |
| 10:15 - 10:30 | Break | |
| 10:30 - 11:00 | The Pseudo Velocity Shock Spectrum | Dr. Howard Gaberson, Consultant |
| 11:00 - 11:30 | TBD | |
| 11:30 - 12:00 | Introduction to Shock Testing | Jeff Morrris, HI-TEST Labs |
| 11:45 - 1:15 | Lunch (no host) | |
| 1:15 - 1:45 | Explosives | Dr. Eric Rinehart, Defense Threat Reduction Agency |
| 1:45 - 2:15 | Failure Mechanisms in Polymers | Prof Rudy Scavuzzo, University of Akron |
| 2:15 - 2:45 | High -G hardening of Structures & Electronics | Ami Frydman, ARL |
| 2:45 - 3:00 | Break | |
| 3:00 - 3:30 | Optimal Shock Isolation | Prof Walter Pilkey, University of VA |
| 3:00 - 4:00 | Ship Shock Simulation & Modeling & Ship System Damping | Prof Young Shin, NPS |
| 4:00 - 4:15 | Wrap-up & Questions | All |

**Please forward this invitation to anyone you know who may be interested in attending this program.**

The seminar is free, but you must register to attend. Please RSVP to Darnise Johnson, (301) 596-0100 or darnise.johnson@saviac.org to assure your space and note packet. SAVIAC reserves the right to substitute topics and/or instructors when necessary. This schedule is subject to change. For more information about SAVIAC and directions to the Seminar Hotel, please visit our website at www.saviac.org.

# Call For Papers

## 77th Shock and Vibration Symposium
## October 29 - November 3, 2006
## Hyatt Regency Monterey
## Monterey, CA

Planning for the 77th Shock and Vibration Symposium is underway, with the selection of the Naval Undersea Warfare Center and Idaho National National Labs as the Government Featured Organizations and ABAQUS and Spectral Dynamics as the Commercial Featured Organizations, and the Hyatt Regency Monterey as the location.

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.

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 1, 2006. You are encouraged to submit online at www.saviac.org, click on 77h S&V Symposium Abstract Submittal. The Program Committee will review the abstracts during the June Program Committee meeting and authors will be notified of acceptance by July 14, 2006. 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 is October 6, 2006.**
Questions should be directed to Joel Leifer, 301.596.0100 or joel.leifer@saviac.org.

Announcement for International Short Course on

# Response of Marine Structures to Underwater Explosions

**March 28-31, 2006**
**Monterey Beach Hotel**
**2600 Sand Dunes Drive, Monterey California 93940**

**Course Lecturers:**

**Professor Thomas L. Geers**
**Dept. of Mechanical Engineering**
**University of Colorado**
**Boulder, Colorado 80309**

**Dr. Young S. Shin**
**Shock and Vibration Research**
**Monterey, California 93940**

## Course Objective & Overview

**Course Objective:**
The purpose of this course is to provide engineers, scientists, and naval architects a discriminating review of underwater explosion phenomena, structural response analysis, fluid-structure interaction, shock spectrum concept, and shock-induced vibration analysis of shipboard equipment.

**Course Overview:**
1. UNDERWATER EXPLOSION PHENOMENA: Sequence of Underwater Explosion Events, Hydrodynamic Relations, Underwater Acoustic Waves, Air-Water Interface, Shock Wave Parameters, Bubble Behavior and Bubble-Pulse Loading, Bulk and Local Cavitation, Scaling
2. ELEMENTS OF STRUCTURAL DYNAMICS: Analytical Dynamics, Classical Linear Oscillator, Two-Degree-of-Freedom System, Finite Element Discretization and Modeling, Finite Difference Time Integration
3. FLUID-STRUCTURE INTERACTION: Athwartship Response of Submarine, Vertical Response of Surface Ship, Submerged Plate Oscillator
4. DAA-BASED ANALYSIS: Submerged Spherical Shell, FE/BE Fluid-Structure Interaction, USA-DYNA, USA-NASTRAN, etc.
5. FLUID VOLUME DISCRETIZATION: Fluid Cavitation, Validation of Computer Codes
6. MODELING AND SHOCK SIMULATION: Three Dimensional Ship Shock Analysis, Modeling and Approaches
7. SHOCK QUALIFICATION OF SHIPBOARD EQUIPMENT BY DESIGN ANALYSIS: Shock Spectra, Normal Mode Analysis, Response of a Multi-DOF System to Shock Motion
8. DYNAMIC DESIGN ANALYSIS WORKSHOP: Dynamic Design Analysis Method (DDAM), DDAM Step-by-step Analysis Procedure, Design Criteria of Shipboard Equipment Using DDAM
9. APPLICATION TO SHIPBOARD EQUIPMENT USING DESIGN ANALYSIS: Application Problems

## Course Organization

**REGISTRATION FEE**
The following registration fee includes the cost of all sessions, coffee breaks, and the course notes.
$ 1,350 --- if paid by February 28, 2006.
$ 1,500 --- if paid after that date.

**ACCOMMODATION**
A block of rooms has been reserved at special rates for short course attendees at the Monterey Beach Hotel (Rates $84). To qualify for these special rates, you must mention that you are attending the "Shock and Vibration Seminar". Attendees should contact the hotel directly to make reservations. The rooms at the special rates will only be held until February 28, 2006.

**COURSE LOCATION**
The course will be conducted in Monterey, California, USA;
Monterey Beach Hotel
2600 Sand Dunes Drive, Monterey, California 93940
Phone: (800) 242-8627 or (831) 394-3321
Fax: (831) 393-1912

**FOR FURTHER INFORMATION, CONTACT:**
Shock and Vibration Research
10150 Blue Larkspur Lane
Monterey, California 93940, USA
Phone/Fax (831) 375-4999, Cell: (831) 277-7117
email: undex2006@sbcglobal.net

## Let Us Know What You Think!

**Did you fill out a symposium evaluation form? You still can! Please visit http://www.saviac.org/76th_Symposium/76th%20Symposium%20Evaluation%20Form.htm to fill out our online 76th Symposium Evaluation Form so that we can continue to bring you the programming you want at future symposia!**

# INDUSTRY NEWS

**New Contamination Control RP on Testing HEPA and ULPA Filter Media**

**Rolling Meadows, IL -** The Institute of Environmental Sciences and Technology (IEST) has issued Contamination Control Recommended Practice IEST-RP-CC001.4, HEPA and ULPA Filters. This Recommended Practice (RP) covers the basic provisions for high efficiency particulate air (HEPA) and ultra low penetration air (ULPA) filter units for applications requiring extremely high filter efficiency (99.97% or higher) for submicrometer particles. The newly revised RP now provides performance information for 11 filter types, including Types G through K. The section on filter design has been expanded and four appendixes have been added, including a handy Filter Selection Guide that lists typical applications for each filter type. More information is available online at www.iest.org or by calling IEST at (847) 255-1561.

**Smallest, Lightest, Triaxial ICP® Accelerometer**

**Depew, NY -** The Vibration Division of PCB Piezotronics, Inc., has introduced a new Miniature, Triaxial, Light Weight, Ceramic Shear ICP® accelerometer. Model 356A13, has a sensitivity of 5 mV/g and a measurement range of +/- 1000 g peak. It is hermetically sealed in a titanium housing and is adhesive mounted. It features an integral, light gauge, twisted quad cable extending 5 ft. from the sensor, terminating in a 4-pin jack. This allows the cable to be easily routed around components especially when the sensor is mounted in tight areas. Also included with each sensor is a 5 ft, 4 conductor shielded cable with a mating 4 pin plug, terminating in 3 BNC plugs, for a full running length of 10 ft. The 356A13 is ideally suited for shock and vibration measurements in space restricted locations, on very small lightweight structures. Its' small size, 0.25 in cube (6.35mm), light weight 0.04 oz (1.0 gm) and unique cable arrangement make it ideal for use anywhere mass loading must be minimized. Sensor features built-in microelectronic signal conditioning circuitry which offers a low-noise, low impedance output signal while permitting long distance signal transmission and simplicity of operation. This durable design operates in -65 to +250 °F temperatures, and survives accidental shock inputs to +/- 10,000 g. For additional information on this accelerometer, contact the Vibration Division of PCB Piezotronics, Inc., toll-free, at 888-684-0013; E-mail: vibration@pcb.com; or fax at 716-685-3886.

# Conference & Short Course Announcements

**IMAC XXIV: Looking Forward: Technologies for IMAC**

*Society for Experimental Mechanics*

**January 30 - February 2, 2006**

**St Louis, MO**

IMAC is organized by the Society for Experimental Mechanics, which strives to support the modal, civil structures and analytical dynamics communities. The theme for IMAC XXIV, "Looking Forward: Technologies for IMAC," has been formulated to encourage session development around these focus areas.These topics may represent many of the key research areas related to structural dynamics. Topics include: Acoustics, Adaptive Structures, Biodynamics, Bridges, Civil Engineering Structures, Damping, MEMS, Modal Validation and Uncertainty Quantification, Non-Linear Systems, Rotating Machinery, Structural Health Monitoring, Shock & Vibration, Sensors/Instrumentation, and Sports Equipment Dynamics. Visit www.sem.org for more information on IMAC XXIV, registration, and pre-conference courses.

**Practical Shock Analysis & Design Course**

*Henry Pusey, MFPT*

**Winchester, VA**

**March 6-10, 2006**

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. Contact MFPT: Telephone (540) 678-8678 Email:mfpt@adelphia.net, web: http://www.mfpt.org and http://www.saviac.org/Courses/Shock%20Course.htm for a more comprehensive overview of the course, and for a list of instructor bios.

**Visit www.saviac.org/MIsc/upcoming_events.htm for more events**

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