

The ESD Association newsletter, for everyone with an interest in the understanding and control of electrostatic discharge.



THRESHOLD™

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News bits

ESD Education and Research

A look at academic activities in ESD education. See page 6 for an update on how today's education is preparing new ESD professionals.

First Program Manager exam

The ESD Association is offering the first Program Manager exam at the 2005 EOS/ESD Symposium. See page 3 for details.

Education schedule

The education schedule now includes this year's EOS/ESD Symposium courses. See page 5 for more information.

Online seminar

The next online seminar, Air Ionization, has been re-scheduled for October 25. See page 8 for more information.

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To Anaheim for ESD education

The 27th Annual EOS/ESD Symposium is being held in beautiful Anaheim, California. Join us for this year's conference, which promises to be both exciting and informative. This year's symposium offers new topics for workshops, such as ESD in automated equipment and technology scaling for ESD. Also new this year is the Exhibitors Lunch. Complimentary for all attendees, the Exhibitors Lunch is in the Exhibit Hall on Tuesday, September 13, and gives attendees an additional opportunity to network and communicate with professionals in the fields of static control methods, evaluation techniques, and ESD testing.

A Welcome Reception for all attendees will be held on Monday, September 12, at 6:00 PM in the Exhibit Hall. Network with your colleagues, share your ESD work experiences with others, view the exhibits, or simply pass the time meeting new people and making new friends. The 2005 Steering Committee will greet you and answer questions regarding the Symposium.

The annual Awards Breakfast for all attendees will be held Tuesday, September 13 at 7:30 AM. Following breakfast, General Chair Charvaka Duvvury, Texas Instruments Incorporated, will officially open symposium. Vice Chair Carl Newburg, Microstat Labs/ Rivers Edge Technical Service, will present the 2004 EOS/ESD Symposium Paper Awards. Technical Program Chair Donn Bellmore, Universal Instrument Corp., will cover highlights of the 2005 technical program.

The Professional and Technical Women's Reception provides a friendly environment where women in the field of ESD can network and share work experiences. This year's reception will be held

on Tuesday, September 13 from 6:00 PM-7:00 PM.

The ESD Association luncheon on Wednesday, September 14 will feature the ESD Association Annual Meeting. Association President Edward Weggeland, Static Control Components, Inc., will present the Association's annual report, including financial status, progress in new certification, education and standards programs, international activities, and the Association's vision for the future.

To help plan your participation, educational events are programmed along three technical tracks: 1. ESD Test, Failure Analysis, and Systems; 2. Factory, Materials, and ESD Control; and 3. Device, Design, and Technology. Select your area of interest and use the track designations to help fill your symposium experience with courses best suited to your area. These tracks serve as guidelines only—you may attend any event or session you wish.

Tutorials

Sunday, Monday, and Thursday of this year's symposium will again be days dedicated to educational opportunities. Tutorials this year will include two new sessions: Impact of CMOS Technology Scaling on ESD High Current Phenomena and CDM Design and Characterization. Impact of CMOS Technology Scaling on ESD High Current Phenomena is an advanced tutorial that covers the impact of silicon technology scaling on ESD device behavior and on consequent ESD protection design. The physics of CMOS components under high current conditions will be discussed. Also, the technology trends for sub-100nm nodes and their implications for the ESD design window will be covered. Finally, sub-50nm technologies chal-

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Symposia

Continued from page 1

To Anaheim for ESD education

Challenges will be discussed.

CDM Design and Characterization teaches the basic concepts and ideas required to design-in for Charge Device Model ESD tests. The course will cover a brief history of CDM ESD development, the charge and discharge physics, the component level IC CDM testing, the CDM failure mechanisms, the CDM fast transient measurements, the CDM circuit simulations, the CDM design-in strategies and characterization.

Tutorials begin on Sunday, September 11, with the two-day ESD Program Development and Assessment course, also known as the ANSI/ESD S20.20 seminar. Now the most widely recognized standard for effective development and implementation of an ESD control program, the S20.20 seminar gives attendees access to key instruction in ESD control.

The following are highlights of some of the other tutorials available this year:

ESD Basics for the Program Manager

This newly developed presentation is a comprehensive introduction to the fundamentals of ESD causes and control. ESD Basics is a full day seminar consisting of three presentation sections. Part 1 includes an overview of ESD impact on industry, detailed explanations of Charge Generation, Field Measurement, the role of Capacitance and Voltage, Charge measurement and Charge Decay. Part 2 focuses on general explanations and illustrations of Device Failure Mechanisms, including Human Body Model, Charge Device and Field Induction Modes, and explains the Machine Model. Part 3 is concerned with protecting ESD sensitive devices & assemblies, defining the Electro-

static Protected Area (EPA), understanding various ESD control elements and material selection, and includes a brief introduction to ANSI/ESD S20.20 ESD Program Development criteria. Several demonstrations and opportunities for discussion make this an interesting introduction to ESD causes and control. No previous ESD experience is necessary.



Air Ionization: Issues and Answers

The primary method of static charge control is direct connection to ground for conductors, static dissipative materials, and personnel. But a complete static control program must also deal with isolated conductors, insulating materials, and moving personnel that cannot be grounded. Air ionization can neutralize the charge on insulated and isolated objects. This seminar will present the information needed to use ionizers to solve problems caused by static charge. The seminar will first examine the problems caused by static charges in a variety of workplaces, and then review the common methods by which static charges are generated and controlled. Demonstrations will be done to illustrate the basic principles, leading to an understanding of why ionizers must be included in a static control program. The major types of ionizers and their use environments will be ex-

plained. Electrical and performance test methods will be discussed in detail. Ionization measurements using the Ionization Standard will be demonstrated. Installation, safety, maintenance, and contamination issues will be presented. Finally, a number of case histories will be analyzed illustrating the use of ionizers in a variety of work environments.

Impact of CMOS Technology Scaling on ESD High Current Phenomena

This advanced tutorial will cover the impact of silicon technology scaling on ESD device behavior and on consequent ESD protection design. The physics of CMOS components under high current conditions will be discussed. Also, the technology trends for sub-100nm nodes and their implications for the ESD design window will be covered. Finally, sub-50nm technology challenges will be discussed.

Technical Sessions

Technical sessions for this year's symposium feature 54 technical papers from international authors with the latest technological issues and research on ESD and EOS.

The technical sessions are presented on Tuesday, Wednesday, and Thursday, September 13 through September 15. Session topics include on-chip RF, on-chip physics/modeling, on-chip latch-up, testing, factory and materials, and system level ESD.

Following each technical session, meet with the authors for further discussion and detailed questions in the Authors' Corners.

Technical sessions open with the plenary session. This year's invited speaker is Kenneth E. Goodson, Associate Profes-

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From the president

Year Round Education Opportunities



Ed Weggeland

2005 has seen an increase of educational offerings from the ESD Association. Beyond the annual symposium, which still offers the bulk of ESD Association tutorials, we also presented courses regionally and interna-

tionally. Our goal is to offer a wide variety of tutorials in a range of locations to increase convenience to association members and ESD professionals in general. We have discussed these programs in past issues of Threshold and can now reflect on the success of these extended education ventures.

The 2005 offerings began in March

with tutorials for the ESD Certified Professional-Program Manager that were held in the Philippines, Bangkok, Penang, and Singapore. The courses in the Philippines were offered

in conjunction with the first ESD Association local chapter located in Asia. The courses drew local and international attendees and helped bring ESD awareness to new doorsteps.

The seminars in Asia were followed by programs presented in cooperation with ESD Association local chapters in the United States. In Texas, this past April the Texas Chapter in cooperation with the association offered How To's of In-Plant ESD Auditing and Evaluation Measurements at the 3M Innovation Center. In May,

The courses drew local and international attendees and helped bring ESD awareness to new doorsteps.

the association, in conjunction with the North Central Chapter presented the ESD Program Development and Assessment Seminar, the S20.20 seminar, which attracted 17 attendees.

In addition, in June the association presented the Device/Design Seminar in Munich, Germany. Presented in cooperation with the Fraunhofer Institute for Reliability and Microintegration IZM, the Device/Design Seminar makes it more convenient for individuals interested in ESD Certified Professional-Device/Design certification to obtain four required courses in one location over the course of two days.

In October, after the 27th annual symposium has been completed, the Texas Chapter of the ESD Association will also co-sponsor a Program Manager tutorial.

Planning the education schedule for the 2006 year is underway. We look forward to finding new ways to increase the presence of the ESD Association and make more education readily available in more locations. ▲

Certification

First Program Manager exam

The ESD Association is offering the first ESD Certified Professional-Program Manager certification exam in conjunction with the 2005 EOS/ESD Symposium on Friday, September 16. To take this exam, an official certification registration form and

\$50.00 filing fee must be completed and submitted to ESDA headquarters payable at the event, no later than August 31, 2005. In addition, you must have taken all of the required courses and have your eligibility verified by ESDA. An exam fee will also be

applicable.

The ESD Association is extending an offer to certified NARTE engineers regarding required courses. See the ESD Association website for details. ▲

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Symposium

Continued from page 2

To Anaheim for ESD education

sor of Mechanical Engineering at Stanford University. The session title is Advanced Thermal Modeling of Transistors.

Eight interactive workshops on Wednesday, September 14, provide attendees with the opportunity to explore specific topics in depth. The workshops encourage discussion, questions, and audience interaction and participation. Workshop session topics for this year are Silicon Technology Scaling and ESD Reliability; TLP Application for Design and Characterization: Can

We Use TLP in a Different Way?; ESD Control and Design for Extremely Sensitive Class 0 Devices; Automated Equipment, ESD, and Grounding Issues; On-Chip ESD Protection; System Level ESD Considerations; ESD Auditing; Common Auditing Issues; ESD in Cleanrooms; and Cleanroom/ESD/Ionization Guidelines and Considerations.

The Symposium is sponsored by the ESD Association in cooperation with the IEEE. It is technically co-sponsored by the

Electron Devices Society. The general chair is Charvaka Duvvury, Texas Instruments Inc. The technical program chair is Donn Bellmore, Universal Instruments, Corp.

A detailed symposium program is available on the ESD Association website at www.esda.org/symposia.html. ▲

Symposium Registration and Fees

Save by registering early!

You can save time and money by registering in advance. Save hundreds of dollars by registering early. Attendees who take advantage of bundled fees and full-time students will save even more.

Advance registration fees are valid only if received no later than **July 29, 2005**. Registrations received after this date will be processed at the on-site fees.

To register, use the registration form in the program you will receive in the mail in June, download the form from the ESD Association website, www.esda.org, or contact ESDA headquarters by phone at 315-339-6937, fax at 315-339-6793, or email at info@esda.org.

	Advance Fees On or Before July 29, 2005	On-Site Fees After July 29, 2005
Symposium		
ESD Association Members	\$495	\$695
Non-Members	\$595	\$695
Tutorials-Member Prices		
Sunday (Full Day)	\$475	\$575
Monday (Full Day)	\$475	\$575
Thursday (Full Day)	\$475	\$575
Thursday (Half Day)	\$275	\$375
Tutorials-Non-Member Prices		
Sunday (Full Day)	\$575	\$675
Monday (Full Day)	\$575	\$675
Thursday (Full Day)	\$575	\$675
Thursday (Half Day)	\$375	\$475
Student Fees		
50% discount for full-time students. Proof of enrollment required. Student fees apply only to Symposium or Tutorial registration and do not apply to Bundled Fees.		
Bundled Fees (Symposium + 3 full days of tutorials)		
ESD Association Members	\$1,725	\$2,110
Non-Members	\$1,815	\$2,110
S20.20 Seminar (Attendance limited to first 30 registrants)		
ESD Association Members	\$1,495	\$1,595
Non-Members	\$1,595	\$1,595

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Education

Education schedule includes symposium

Below is a list of courses currently scheduled, including tutorials being offered at the 2005 EOS/ ESD Symposium, in Anaheim,

California. The full schedule, including instructor listings, is available online. This schedule is subject to change and will be

updated throughout the year. Check the website, www.esda.org, or contact the ESD Association for the latest schedule.

Course	Location	Date	Designation*	Status
ESD Program Development and Assessment	Anaheim, CA	Sept. 11-12	Program Manager	Confirmed
ESD Basics for the Program Manager	Anaheim, CA	Sept. 11	Program Manager	Confirmed
ESD On-Chip Protection for Advanced Technologies	Anaheim, CA	Sept. 11	Device/Design	Confirmed
System Level ESD/EMI Part 1	Anaheim, CA	Sept. 11	Device/Design	Confirmed
System Level ESD/EMI Part 2	Anaheim, CA	Sept. 11	Device/Design	Confirmed
Air Ionization: Issues and Answers	Anaheim, CA	Sept. 12	Program Manager	Confirmed
ESD On-Chip Protection in RF Technologies	Anaheim, CA	Sept. 12	Device/Design	Confirmed
SPICE-Based ESD Protection Design Utilizing Diodes and Active MOSFET Rail Clamp Circuits	Anaheim, CA	Sept. 12	Device/Design	Confirmed
EOS/ESD Failure Models and Mechanisms	Anaheim, CA	Sept. 12	Device/Design	Confirmed
How To's of In-Plant ESD Auditing and Evaluation Measurements	Anaheim, CA	Sept. 12	Program Manager	Confirmed
ESD Packaging Principles	Anaheim, CA	Sept. 12	Program Manager	Confirmed
Circuit Modeling and Simulation for On-Chip Protection	Anaheim, CA	Sept. 12	Device/Design	Confirmed
Latch-up Physics and Design	Anaheim, CA	Sept. 12	Device/Design	Confirmed
Device Testing—IC Component Level	Anaheim, CA	Sept. 12	Device/Design	Confirmed
Impact of CMOS Technology Scaling on ESD HCPH	Anaheim, CA	Sept. 12		Confirmed
CDM Design and Characterization	Anaheim, CA	Sept. 12		Confirmed
ESD Standards Basics for EPA	Anaheim, CA	Sept. 15	Program Manager	Confirmed
Troubleshooting On-Chip ESD Failures	Anaheim, CA	Sept. 15	Device/Design	Confirmed
Device Technology and FA Overview	Anaheim, CA	Sept. 15	Program Manager	Confirmed
Electrostatic Calculations	Anaheim, CA	Sept. 15	Program Manager	Confirmed
TLP Systems Design Very Fast TLP Applications	Anaheim, CA	Sept. 15	Device/Design	Confirmed
TLP Measurements: Parametric Analyzer for ESD On-Chip Protection	Anaheim, CA	Sept. 15	Device/Design	Confirmed
Cleanroom Considerations for the Program Manager	Anaheim, CA	Sept. 15	Program Manager	Confirmed
ESD Control for Extremely Sensitive Devices	Anaheim, CA	Sept. 15		Confirmed
ESD Packaging Principles	Austin, TX	Oct.12	Program Manager	Confirmed
Air Ionization: Theory and Practice	Online	Oct. 25	General Interest	Confirmed

* Course is a requirement of this certification program

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Education

Academic Activities in ESD Education and Research

by Charvaka Duvvury, Texas Instruments Inc, ESD Association University Outreach Program

ESD is part of the engineering students' curriculum now at numerous universities and research institutes. In many cases it is also part of the graduate student's thesis research topic. This is beneficial for the students for their career opportunities in the electronics industry, as well as for the image of the ESD Association as a strong promoter of ESD education through its own worldwide tutorial programs. In fact, the ESDA has been actively supporting university guest lecture programs and has been offering research grant assistance to encourage fundamental ESD work. Through this article I would like to summarize the major ESD activities at aca-

ademic institutes in USA, Europe, and Asia.

The ESD program at any university can be measured by various criteria, the most important being the number of qualified ESD graduates and the number of research papers published. By "ESD graduate" we mean students who have obtained either masters or PhD and are actively employed in a company focusing on ESD related work.

The major universities in the US for ESD focus include the University of Illinois (UI) and Stanford University. At UI, Professor Elyse Rosenbaum is currently supervising five PhD students with research work focusing on ESD protection circuits and

ESD modeling. At this university, which successfully produced several PhDs under Professor Steve Kang and Professor Rosenbaum with thesis work in ESD, design classes in ESD are offered for senior level students. At Stanford, under the supervision of Professor Bob Dutton, Professor Ken Goodson, and Dr. Kaustav Banerjee (currently associate professor at University of California at Santa Barbara), five PhDs were granted with work on ESD thermal physics and device phenomenon. Currently at Stanford more advanced thermal modeling work is ongoing. Professor Albert Wang at the Illinois Institute of Technology has been both teaching ESD and

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Symposium

2005 EOS/ESD Symposium Schedule Summary

Download a symposium program at www.esda.org/symposia for complete schedule and course details.

September 11-16, 2005 Marriott Anaheim, Anaheim, California

Sunday, September 11, 2005

Registration
Standards Meetings
ANSI/ESD S20.20 Seminar, Part 1
ESD Tutorials

Monday, September 12, 2005

Registration
ANSI/ESD S20.20 Seminar, Part 2
ESD Tutorials
Welcome Reception
Exhibits (PM only)

Tuesday, September 13, 2005

Registration

Awards Breakfast
Exhibits
Technical Sessions
Exhibitors Lunch for attendees
Professional and Technical Women's Reception
Professor's Reception

Wednesday, September 14, 2005

Registration
Technical Sessions
Exhibits
Workshops
Association Luncheon and Annual Meeting

Thursday, September 15, 2005

Registration
Technical Sessions
Tutorials

Friday, September 16, 2005

ESD Certified Professional-Program Manager certification exam

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Symposium

Corporate Membership program can save money

If you'd like to send several people to this year's EOS/ESD Symposium, but are concerned about the costs, take a close look at the ESDA Corporate Membership program. This package not only includes symposium and tutorial registrations, but also coupons for additional educational programs that can be used for the symposium or other ESDA sponsored programs throughout the year. You can also receive multiple individual memberships,

a Standards Enterprise-Wide Site License, and a paper ANSI/ESD S20.20 review of your ESD control program. You can save as much as 45% over purchasing the items separately. Sign up now to reduce your costs of sending multiple individuals to the 2005 Symposium and save on a variety of ESD Association programs and services during the coming year.

Two package types are available to suit different needs:

- User package—designed for companies who have a use for ESD control and design education
- Vendor package—designed for companies interested in exhibiting at the EOS/ESD Symposium.

Download program details at www.esda.org/symposia.html or call the association at 315-339-6937.▲

Education

Academic Activities in ESD Education and Research

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conducting ESD research work with graduate students, most notably in the area of ESD simulations. Some work on protection device concepts and simulations is being done at the University of Central Florida as well. Also, under Professor William Greason's direction, work on ESD electrostatics has been an important contribution in the E.E. Department of the University of Western Ontario in Canada. Other Canadian universities with interest in ESD work include the University of Alberta in Edmonton.

For Europe, very important work in ESD has been ongoing at IMEC in Belgium, the Swiss Federal Institute of Technology in Zurich, University of Padova in Italy, and the University of Twente in the Netherlands. At IMEC, Professor Herman Maes and Dr. Guido Groeseneken have produced outstanding PhD and masters program

graduates in ESD who are currently employed in major electronic corporations. Some of their pioneering work includes the HBM tester model, the test methods, device modeling, and RF ESD protection. Basic and advanced ESD courses in ESD design and modeling are offered at the Catholic University that is associated with IMEC. At the Swiss Institute, Professor Wolfgang Fitchner has directed some well known PhD candidates in ESD device physics during the last 10 years. At the University of Twente, under the guidance of Professor Fred Kuper and Professor Ton Mouthaan, three PhDs with work in ESD modeling and device physics have graduated. Currently a few more are actively pursuing graduate work in ESD physics. An advanced ESD device course is also offered at the University of Twente. Professor Gaudenzio Meneghesso at the Uni-

versity of Padova is conducting ESD research with two PhD students and several masters students. Much of the ESD course work and research at this institute is focused on device physics and RF ESD devices. Also active in ESD research in Europe are Professor Marise Bafleur at LAAS-CNRS in France whose advanced work is in ESD modeling and Dr. Horst Gieser and Dr. Henry Wolfe at the Fraunhofer Institute in Germany whose active work is in ESD measurement techniques.

Much of the ESD academic activity in Asia is done at the National Chiao-Tung University in Taiwan under the direction of Professor Ming-Dou Ker. In a few short years, already three PhD and twelve masters students have graduated with work in ESD. Professor Ker is now supervising four PhDs and five masters students. A regular course in ESD on device and design

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Education

Online tutorials update

The ESD Association Continues online course presentation with Ionization: Theory and Practice, presented by Arnold Steinman, Ion Systems Inc. Solve problems caused by static charge with air ionization with the aid of an hour long presentation provided online October 25 at 1:00 PM EST.

The primary method of static charge control is direct connection to ground for conductors, static dissipative materials, and personnel. But a complete static control program must also deal with isolated conductors, insulating materials, and moving personnel that cannot be grounded. Air ionization can neutralize the charge on insulated and isolated objects. This seminar will cover the following topics:

- Importance of Ionization in a Static Control Program
- Ionization Fundamentals and Methods
- Ionizer Selection Criteria and Examples
- ANSI ESD S20.20 Static Control Program Requirements for Ionization

The instructor for this course, Arnold Steinman is chief technology officer for Ion Systems Inc., Berkeley, CA, responsible since 1983 for the design concepts of the company's ionization static control products. He holds four patents covering air ionizer technology. Steinman is a member of the Board of Directors of the ESD Association and a past chairperson of the Ionization Standards Committee. Steinman is also a senior member of the Institute of Environmental Sciences and Technology (IEST) and a member of the Electrostatics Society of America. Visit www.esda.org/upcomingcourses.html to download a course flyer and registration form. ▲

Standards

Update on Standards activity

June 2005 Standards Meeting Series

The ESD Association Standards Committee (StdCom) and standards working groups (WG) held their June 2005 meeting series at the John Ascauga's Nuggett Resort Hotel, in Reno, NV from June 9 through June 12.

The Standards Committee approved one new document for publication. ESD S6.1-2005 - Grounding was approved for publication. ESD S6.1-2005 is a revision of ANSI/ESD S6.1-1999 Grounding Recommended Practice.

June 2005 Working Group Activities

Garments-WG 2 received and reviewed Technical and Administration Support Committee (TAS) comments. The Garments Working Group Chair (WGC) met with the TAS Representative to discuss Work in Progress 2.1 (WIP). WG2 will respond to TAS comments by August 1. TAS will perform a final review before the September meeting series.

Ionization-WG 3 announced the publication of TR3.0-02-05 Selection and Acceptance of Air Ionizers. This technical report is a revision and redesignation of ADV3.2. WG3 reviewed STM3.1 as part of the ANSI five-year review requirement. The WG added one test point and intends to enhance the illustrations. WG3 also began reviewing SP3.3-Periodic Verification. A five year review of this standard practice is also forthcoming.

Human Body Model Device Testing-WG 5.1 reviewed the proposed changes to the STM5.1-2001 document. After discussing the changes, some changes were deemed necessary and others needed further discussion. The WG is now considering writing a technical report to clarify

some new ESD testing issues. WG5.1 will continue to review and revise ANSI/ESD STM5.1-2001 during its five year review period. WG5.1 submitted two documents to StdCom for vote-by-mail. Both documents require further discussion with voters.

CDM Device Testing-WG 5.3.1 reviewed action items and closed each completed item accordingly. Extensive discussions included spark free calibration method versus calibration/verification using test modules. A WG member presented waveforms taken from calibration/verification modules made on RF35. Testing experiments comparing two materials under humidity extremes were assigned to three working group members.

Transient Latch-up Device Testing-WG 5.4 members were assigned to prepare a round robin plan to extend across all devices. Teleconferences were scheduled.

Transmission Line Pulsing (TLP)-WG 5.5 presented round robin GaAs data in February 2005, and followed up with a presentation of SOLZ data during this meeting series. The WG decided to put the Very Fast Transmission Line Pulse (VF-TLP) Draft A on hold for now, and focus on elevating standard practice 5.4 to a standard test method.

Grounding-WG 6 completed an industry review since the February 2005 meeting series. WG6 discussed the industry review comments. ESD S6.1-2005 was approved by StdCom for elevation to a full standard.

Flooring-WG 7 ANSI/ESD S7.1-2005-Resistive Characterization of Floor Materials has been published and is available for

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Symposium

Exhibit at the 2005 EOS/ESD Symposium



Good exhibit space for the 27th annual EOS/ESD Symposium is still available! Exhibitor information is available online at www.esda.org/exhibits.html. To reserve your space or for information on exhibiting, contact Lisa Pimpinella phone, 315-339-6937; or fax, 315-339-6793.

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Evaluation Engineering
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Solid State Technology
Surface Mount Technology
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Sponsor

ESD Association

Symposium

Continued from page 7

Academic Activities in ESD Education and Research

topics is taught with nearly 100 students taking this class. As a result of such intense academic activity at the National Chiao-Tung University, more than 100 papers on subjects ranging from RF ESD

design to System Level ESD protection methods have been published.

While this summary highlights some of the major ESD academic work, there are indeed several other institutes worldwide

in Wisconsin, Missouri, Washington, Denmark, Finland, and Japan that are conducting ESD research work. It is exciting to see that within the last twenty years so much interest in ESD education has been

Continued on page 11

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Standards

Preliminary September Meeting Schedule

**ESD Association
Standards and Association
Committee Meetings
September 8-11, 2005**
Marriott Anaheim, Anaheim, California

Thursday, September 8

TAS 8:00-5:00

Friday, September 9

TAS 8:00-5:00

WG-3, Ionization 8:00-Noon

WG-5, Device Testing 8:00-5:00

WG-10, Handlers 1:00-5:00

Saturday, September 10

TAS 7:00-5:00

WG-5, Device Testing 8:00-5:00

WG-53, Workstations 8:00-Noon

WG-55, Cleanrooms 8:00-Noon

WG-6, Grounding 8:00-Noon

WG-11, Packaging 1:00-3:00

WG-2, Garments 3:00-5:00

WG Chair Meeting 5:30-6:30

Mixer 6:30-7:30

Sunday, September 11

TAS 7:00-5:00

WG-14, ESD Simulators 8:00-Noon

WG-7, Flooring 8:00-Noon

WG-15, Gloves 8:00-Noon

DAR/STDCOM 1:00-3:00

Board of Directors 5:30-7:00

Local Chapters 8:00-10:00

Standards

Update on Standards activity

Continued from page 8

sale. WG7 reviewed a new flooring technical report, and plans to have the TR to TAS for review before the September 2005 meeting series.

Handlers-WG 10 reviewed Charged Device Model (CDM) data (waveforms) and the capacitor discharge data from an actual handler. The WG also discussed designing a new discharge target and action items were assigned to build a new target and collect data.

Packaging-WG 11 reviewed data from four labs using preliminary first-lab testing method. The WG discussed two key variables from these results: 1) repeatability and 2) measurements cannot be made with a faraday cup that leaks charge to the instrumentation. The WG will study the design differences between cups to understand the source of this problem.

Simulators-WG 14 Presentation of cable discharge events (CDE) waveforms was discussed. Action items were assigned for completion before the September 2005 meeting series. WG14 also briefly discussed the next steps, which include standard practice for metrology and standard test method for system level.

Gloves-WG 15 completed a StdCom vote-by-mail since the February 2005 meeting series. WG15 reviewed comments with voters. WIP15-2005 will be modified and returned to TAS for final review in preparation for industry review. WG members were asked to provide a list of names for this review.

Workstations-WG 53 discussed TAS review and comments on the Compliance Verification document. WG53 will be removing frequency from each section and adding an Appendix to the document. ▲

Symposium

The local scene in Anaheim, California

2005 finds the EOS/ESD Symposium in sunny California. The Anaheim Marriott Hotel will host the 27th annual EOS/ESD Symposium.

The Anaheim Marriott is in the heart of an area full of business and recreation. Only two blocks from Disneyland Park, Disney's California Adventure, and Downtown Disney, you are also not far from natural beauty to be found at places such as the Bolsa Chica Ecological Reserve, the Arden canyon, and Crystal Cove State Park.

The Anaheim Museum, "A Walk Through Local History," has exhibits of local culture

and art. Anaheim also offers the Arrowhead Pond, a highlighted spot for entertainment and sports. The Arrowhead is a 650,000 square foot arena is the home of the NHL Mighty Ducks of Anaheim and annually hosts the Ringling Bros. and Barnum & Bailey Circus, Disney on Ice, and the Harlem Globetrotters.

Anaheim is also the home of the Anaheim Angels, who have played at Angel Stadium of Anaheim since their move from Los Angeles after the 1965 season. ▲

*source: www.anaheimmuseum.com;
www.arrowheadpond.com; <http://losangeles.angels.mlb.com>*

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Association news

And the survey says...

Each month *Threshold*™ provides a column to address the many questions and comments expressed by association members in their responses to an email survey conducted by the ESD Association's Human Resources Business Unit.

The Survey Says column will not appear in this issue, but will return in the September/October issue. Be sure to check back for more association responses to member questions. ▲

Association news

ESD Roadmap now available

The "Electrostatic Discharge (ESD) Technology Roadmap," which became available in March of 2005, details projected ESD sensitivity trends brought about by changes in device design.

The Roadmap includes a review of past trends with a comparison to the future. The Roadmap begins with a look at the history of ESD:

In the late 1970s, electrostatic discharge became a problem in the electronics industry. Low level ESD events from people were causing device failures and yield losses. As the industry learned about this phenomenon, both device/design improvements and process changes were made to make the devices more robust and processes more capable of handling these devices.

In the mid to late 1990s however, the requirements for increased performance

(devices that operate in Giga-Hz range) and the increase in the density of circuits on a device caused problems for traditional ESD protection circuits. To achieve the performance and density numbers required by industry, the devices have become more sensitive to ESD events since the late 1990s. The current trend, which is expected to continue, is circuit performance at the expense of ESD protection levels.

In developing the Roadmap, it was determined that as devices become more sensitive through the year 2010 it will be imperative that companies begin to determine the ESD capabilities for their handling processes.

The Roadmap was developed by ESD device and design experts from several major corporations, IBM, Intel, Texas Instruments, and Celestica, Inc.

The Roadmap can be downloaded in PDF format from the ESD Association website at www.esda.org. ▲

Education

Continued from page 9

Academic Activities in ESD Education and Research

generated mostly due to challenges with the subject and the realization that ESD will continue to play an even greater role in the future reliability in electronics. Needless to say, the ESD Association will continue to support ESD education and fundamental research to understand the complex effects of ESD on advanced technologies. This will be done through even more support for the university programs. Every year at the EOS/ESD Symposium we offer a chance for professors to informally meet and exchange ideas. This year we have reinstated the university research grant program; grant program details can be found on the ESD Association website.

Finally, I would like to thank many of the university professors that I have had contact with during their continued interest in ESD. The EOS/ESD Symposium Technical Committee members who maintain their own university research collaboration, along with the board of directors of the ESD Association who enthusiastically support the university programs, are also to be commended. I really do not see any end to the exciting opportunities to important ESD programs at the universities. ▲

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www.electrostatics.org

The Electrostatic Society of America (ESA) is devoted to the advancement of electrostatics, encompassing a wide breadth of areas including MEMS, biological and industrial applications

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Calendar

September 2005

September 11-16

EOS/ESD Symposium and Exhibits

Tutorials/ Technical Sessions/ Workshops
Marriott Anaheim, Anaheim, California
www.esda/symposia.org

September 19

North Central Chapter

Chapter Meeting
Celestica, Arden Hills
www.esd.northcentral.org

September 19-22

IDEMA Diskcon-USA 2005

Westin Hotel, Santa Clara Convention
Center
www.idema.org

October 2005

October 12

ESDA Tutorial: ESD Packaging Principles

3M Innovation Center, 6801 River Place
Boulevard, Austin, Texas
www.esda.org/upcomingcourses.html

October 25

ESDA Online Program: Air Ionization

Web Seminar
www.esda.org/upcomingcourses.html



Threshold

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November/December	Oct. 1
January/February	Nov. 19
March/April	Feb. 1
May/June	April 1
July/August	June 1

Threshold Institutional Listings

Space in the Threshold Institutional Listings, which appear at the bottom of newsletter pages, can be purchased for \$600.00 for six consecutive issues. Larger contributions are welcome. No agency fee is granted for soliciting such contributions. Inquiries, or contributions made payable to the ESD Association, should be sent to

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