

News bits

New ESDA email address

The ESDA has a new email address. For general email communications, use the following address: info@esda.org. The Association's AOL address is being phased out.

ESDA makes board appointments

The ESD Association has appointed Kay Adams, Tech-Wear, as treasurer and Joe Bernier, Intersil, as secretary.

Swenson named exhibitor liaison

David E. Swenson, 3M/Electronic Handling and Protection Division, has been appointed by the Association board of directors as exhibitor liaison. He will represent the interests of the Symposium exhibitor community to the Association board. He can be reached at 512-984-3153, email: deswenson2@mmm.com

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Symposium program taking shape



Symposium steering committee members tour the Charlotte Convention Center as they finalize plans for the 24th annual EOS/ESD Symposium, October 6-10 in Charlotte, NC.

Although the venue of Charlotte, North Carolina, may be new, this year's EOS/ESD Symposium attendees will still be greeted by the familiar—a high quality technical program, representing the best education and the latest research and technology that the international ESD community has to offer.

By combining technical sessions with tutorials, workshops, exhibits, and other events, attendees will be able to customize and concentrate their Symposium experience along their specific areas of interest.

Technical sessions

Running October 6-10, this year's Symposium features more than 50 papers

to be presented in parallel sessions. The topic areas comprising the nine technical sessions are *Systems, On-Chip CMOS, RF ESD Design and Technology, MR Device Issues, MR Factory Issues, Simulation and Modeling, Factory and Materials, Standards and TLP*, and *Device Effects*.

Tutorials and Workshops

The week's events officially open Sunday, October 6 with a full-day of ESD tutorials followed by additional tutorials on Monday and Thursday. The preliminary tutorial schedule includes topics such as *ESD Basics, On-Chip*

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Log in to the
Members Only
section

www.esda.org

From the Threshold chair

Threshold is going web-based – No more hard copies!

No more hard copies of *Threshold*?

That is correct, and we think that most of you will be pleased with the change. The newsletter will be available in PDF format on your PC/laptop beginning with the July/August issue. The issues will be distributed in the beginning of the first month of each bi-monthly issue. In fact, a great idea just occurred to me as I am penning this column: how about a *Threshold* issue every month with fewer pages? Let me hear from you as to what you think. Send responses c/o the editor, thanks.



Leo G. Henry

Over the last few years more and more companies, societies, associations, and

even magazines have been switching to web-based only newsletters. Surveys say that the switch has been quite successful.

Here is our current plan for the electronic distribution of *Threshold*. This issue (March/April) and the next one (May/June) will continue to be sent to the full membership as a paper copy. Beginning with the July-August issue, we are going to a web-based only publication. What does that mean? First, it means that all members will be sent an email notification that the July-August issue of *Threshold* is available as a PDF file on the ESDA web site. It can now be either downloaded or just read on line from the ESDA Members Only section of the ESDA web site.

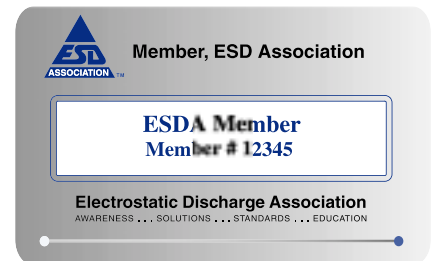
We do not want to send you a large attachment that could bog down your email server. Instead, we will send you an email notification that will contain a clickable link that takes you directly to the ESDA's Members Only logon page. This way you can either read *Threshold* on screen or

print it out. The choice is yours.

Where will we get that email address you ask? Here is where we need your help and full cooperation.

A few months or more ago, ALL members were sent their green and white ESDA membership card with membership number (see below) and instructions for logging on to the Members Only section of the ESDA website (www.esda.org). You were asked to use your membership num-

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Threshold

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Threshold™ Publication Schedule

Issue	Deadlines
May/June	April 1
July/August	June 1
September/October	Aug. 1
November/December	Oct. 1
January/February	Dec. 1
March/April	Feb. 1



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Association news

ESDA schedules ESD design seminar March 26-27

Scheduled for March 26-27, 2002, the ESD Association's first ESD Design Seminar is rapidly taking shape.

Developed by the Association's Council on Education (ACE), the two-day technical seminar for on-chip ESD protection designers will be held at the Holiday Inn - Great America, in Santa Clara, CA.

Created specifically to meet the needs of persons responsible for ESD protection in circuit design, the seminar is part of the Association's effort to expand technical education beyond the annual EOS/ESD Symposium.

The seminar program will include in-depth technical education in a number of specific areas including the following:

ESD in the Industrial Semiconductor IC Context: What is ESD? Why is it

important? What methods are used to control it?

ESD Models and ESD Testing: Description of the three models and model issues from the designer point of view.

ESD Device Operation: Fundamentals of MOS device operation, the role of the PMOS, BiCMOS and the similarity of the techniques for CMOS, Bipolar devices, DENMOS and DMOS devices and protection techniques.

ESD Circuit Operation: Operation of, and issues with, nMOS circuits including implementation, simulation, and experimental results.

Technology Impact on ESD Design Choices: Review of ESD protection design options as a function of technology and process fluctuations.

Special Circuit Requirements and Their Impact on ESD: Mixed voltage pro-

tection, RF and analog protection, BiCMOS and high voltage protection.

CDM ESD Protection: Concerns and considerations; fast enough diodes, transistors and SCRs; the on-chip CDM event.

Design Examples and Case Studies: Layout methods, ESD rules, case studies of protection design problems, and class exercises.

Instructors for the seminar are Charvaka Duvvury, Texas Instruments, and James W. Miller, Motorola.

Detailed information on the seminar has been mailed to all ESDA members and also is posted on the ESDA web site, www.esda.org. For more information on the ESD Design Seminar, contact ESDA headquarters.

Calendar of events

March 2002

Midwest ESD Chapter Meeting: March 13, 2002; Personnel Grounding—Back to the Future, Joe Jesse, Key Industries; Bimbo's Restaurant, Palatine, IL; www.midwestesd.org

Texas Chapter Membership Meeting: March 18, 2002; Electrical Field Measurements, Don Pritchard, Trek, Inc.; Sematech, Austin, TX; www.centxesdassoc.homestead.com

Silicon Valley EOS/ESD Society Membership Meeting: March 19, 2002; Complying with S20.20 and Training Demonstrations, Ted Dangelmayr, Ion Systems; Ramada Inn, Sunnyvale, CA; www.esdsiva.org

ESD Design Seminar, March 26-27; Holiday Inn-Great America, Santa Clara, CA; www.esda.org

April 2002

Midwest ESD Chapter Meeting: April 10, 2002; ESD-Safe Plastics and Polymers, Bob Benson, Clariant Technologies; Bimbo's Restaurant, Palatine, IL; www.midwestesd.org

Silicon Valley EOS/ESD Society Membership Meeting: April 16, 2002; ESD-Related Issues in Flooring; Ramada Inn, Sunnyvale, CA; www.esdsiva.org

May 2002

Texas Chapter Membership Meeting: May 20, 2002; ESD Packaging, Jud Bradford, Joe Blanchard, Bradford Company; Sematech, Austin, TX; www.centxesdassoc.homestead.com

SIVA's ESDiscovery: May 21, 2002; Santa Clara, CA; www.esdsiva.org

June 2002

Northeast Chapter Panel: June 11, 2002 (Tentative); Dispelling ESD

Common Myths; Nepcon East; www.nechaptersda.org

ESDA Standards and Committee Meetings: June 14-18, 2002, Riviera Hotel, Las Vegas, NV, www.esda.org

July 2002

Texas Chapter Family Night: July 23, 2002; Round Rock Express Baseball Game; www.centxesdassoc.homestead.com

October 2002

ESDA Standards and Committee Meetings: October 3-5, 2002 (Tentative); Omni Hotel, Charlotte, NC; www.esda.org

David F. Barber Sr. Memorial Golf Tournament: October 5, 2002; Charles T. Myers Golf Course, Charlotte, NC; www.esda.org

EOS/ESD Symposium: October 6-10, 2002; Charlotte Convention Center, Charlotte NC USA; www.esda.org

EOS/ESD Symposium

Continued from page 1

Symposium program taking shape

Protection, ESD in Highly Sensitive Devices, among other ESD topics. Several tutorials will assist attendees in preparing for the ESD certification exams tentatively scheduled for Friday, October 11.

Interactive workshops on Wednesday afternoon will cover topics ranging from *On-Chip Protection* to *TLP, Cleanrooms, Magnetic Recording, and ESD Control Programs*.

Exhibits and other events

Attendees also will have the opportunity to visit the exhibits of more than 100 companies that provide ESD control products and services. The exhibits are open to anyone interested in EOS and ESD.

Other events include authors' corners that provide opportunities to discuss the technical papers with the authors,

receptions, keynote presentation, and the ESDA annual meeting and recognition luncheon.

The ESDC certification exams are tentatively scheduled for Friday, October 11. Special tutorials during the week will help applicants prepare for the examinations.

The detailed program will be mailed in early summer and also will be available on the Association's web site, www.esda.org.

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 Steven H. Voldman, IBM Microelectronics. The vice general chair is Joseph Bernier, Intersil Corporation. The technical program chair is John Kinnear, IBM Corporation.

Symposium promotional opportunities

The 24th annual EOS/ESD Symposium will offer exhibitors and other companies a number of marketing and promotion opportunities, several of them new for this year's event.

Exhibits Directory

The Symposium will again publish a separate exhibits directory containing detailed information on the 3-day exhibits program. In addition to the free company and product listings in the directory, exhibiting companies also may purchase half and full page advertisements to expand awareness of their company products and services.

Charity Golf Tournament

The second annual David F. Barber Sr. Charity Golf Tournament on October 5 offers several opportunities including hole sponsorships, team sponsorships and door prizes. For more information on the tournament itself, see the article on page 10 of this issue of *Threshold*.

Symposium advertising opportunities

New this year is the opportunity for companies to support the Symposium and create company awareness at various events such as the tutorial lunches, coffee breaks, the welcome reception, and the opening breakfast. Event signage or on-screen slides will prominently identify and promote companies participating in these opportunities.

Costs, deadlines, and other requirements for each of these programs will be included in the exhibitors manual to be mailed to each exhibiting company in May. Additional information also may be obtained by contacting Association headquarters.

Preliminary EOS/ESD Symposium Schedule October 6-10, 2002 Charlotte Convention Center Charlotte, North Carolina, USA (Subject to Change)	
Saturday, October 5 Registration Opens Charity Golf Tournament	Wednesday, October 9 Technical Sessions Exhibits ESD Association Luncheon/ Keynote Speaker Workshops
Sunday, October 6 Tutorials	Thursday, October 10 Technical Sessions Tutorials
Monday, October 7 Tutorials Welcome Reception (In Exhibit Hall) Exhibits	Friday, October 11 ESDC Technician Exam ESDC Engineer Exam
Tuesday, October 8 Awards Breakfast Technical Sessions Exhibits	

Tutorials meet the demand for ESD education

Even in a slowing electronics economy, the demand for ESD education remains strong, a demand that continues to be met by the tutorial program in conjunction with the EOS/ESD Symposium.

The 2001 tutorials were programmed along four distinct tracks (Factory, Protection Design, Systems, and MR Heads & Technical) with 22 different sessions providing detailed ESD education on a variety of topics. "With over 62% of the attendees indicating that they were first-time attendees, clearly our tutorial program is appealing to new audiences," comments Burt Unger, who chairs the tutorial program.

"Although we have many new attendees each year, we also have a large percentage of repeat attendees, 32% last year," Burt continues. "Thus we work hard to expand or revised those tutorials presented previously, as well as adding new tutorial every year." The 2001 program featured five totally new tutorials: *Practical Application of ANSI/ESD S20.20*; *Application and Process Dependent Design Strategy*; *ESD Control and Practices for Extremely*

Sensitive Devices; *CDM Protection Design and Test*; and *Common Issues Complying with S20.20 and Training Demonstrations*.

The tutorial program not only provided attendees with specific educational opportunities, but also included ten sessions designated as preparatory for taking the ESD professional certification examinations.

Typically tutorial attendees come from throughout the world. About 40% of the 2001 attendees were from outside the United States. Attendees represented 26 different countries and 32 US states.

The tutorials and the instructors continue to receive high rankings from the attendees who fill out questionnaires at the end of each tutorial session. For 2001, the average rating for instructors was 4.5 out of 5.0. The average course rating was 4.2 out of 5.0. "These attendee ratings are very important to us in evaluating both instructors and courses for future tutorial," explains Burt. "They not only help us in determining what courses to offer and which instructors should teach the courses, but they help us and the instruc-

tors improve the courses and the presentations."

The satisfaction of the attendees is further reflected in the written comments such as the following:

Complete!

Excellent tutorial.

Outstanding presentation.

The tutorial was all I expected.

Very interesting and informative.

The instructor was very informative and gave very good insights, especially his real-life experience.

Although the 2002 tutorial program is still months away, Burt is already preparing the program. "We review the input from the questionnaires, look at the educational needs of the prospective audience, and review trends in the market place to create an 2002 tutorial program that continues to fill the demand for ESD education."



Attendees are all ears as Steve Halperin covers auditing measurements (left). Al Wallash (above) tackles the subject of MR heads and other highly sensitive devices.

February 2002 standards meetings and activities

by

Michael T. Brandt, Editor

The ESD Association standards committee and standards working groups held their February meetings in Charlotte, NC. Much of the activity focused on updates and revisions to existing documents and the continuing development of various technical reports. A summary activity of the various working groups appears below.

Working Group Activities

Ionization WG-3 addressed various issues in its draft technical report covering alternate test methods to the charged plate monitor (CPM) for determining discharge time and offset voltage in ionizers. The group also evaluated a new CPM test fixture that allows adjustment of both plate size and plate to ground spacing. Preliminary evaluation of the fixture indicated that the fixture showed excessive self decay. The working group is researching solutions to this problem as well as problems of dielectric absorption. In addition, the group reviewed test data taken with the existing test fixture using a 6" x 6" plate and different spacings to the ground plane.

Worksurfaces WG-4 reviewed input to its draft technical report *A Survey of Static Control Worksurfaces and Grounding Mechanisms* and made several changes, including adding some drawings. The draft is ready for additional internal review.

Human Body Model Device Testing WG-5.1 focused on a new method for calculating waveform parameters. The new method proposes using a mathematical exponential equation of the HBM decaying waveform. The data can be extracted from digitized data from the oscilloscope and used with a spreadsheet program to automatically calculate the val-

ues. Additional work is planned to more fully evaluate the proposed methodology.

Machine Model Device Testing WG-5.2 began development of an industry survey to assess degree of usage of machine model testing methods, determine the ability of users to replicate product factory and field failures, and identify tester correlation issues. The group also began discussion of the preparation of a technical article on machine model issues.

CDM Device Testing WG-5.3.1 continued evaluation of various "hot topics" (dielectric materials, verification modules, ground plane, calibration, and CDM stress testing) for consideration in future improvements of the standard. The group also discussed verification and calibration procedures as well as issues of improved equipment to reduce problems of repeatability.

Socket Discharge Model (SDM) Device Testing WG-5.3.2 concentrated on development of its standard practice document, discussing initial data that showed variances in the SDM stress voltages from 10-15% depending on the wire trace

length of the TFM. The group will gather additional data to better define the relationship of current values to stress voltage.

Transient Latch-Up Device Testing WG-5.4 worked on its standard practice document evaluating data and procedures for determining the waveform shape and period. The group believes that it may have identified a prototype TLU generator that produces the proper waveform.

Transmission Line Pulsing WG-5.5 addressed numerous issues in the development of its standard practice document, including discussions of averaging and measurement, definition of the waveform, and the tightening of various specification parameters. They anticipate a new draft will be ready for internal review by June.

Flooring WG-7 established the round-robin test procedures for taking resistance measurements flooring materials at 10 volts. The procedures will include measurements taken under varying environmental conditions using different types of resistance meters on flooring samples with different resistance levels.

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Tentative Schedule June ESD Association Standards Meeting Series Riviera Hotel, Las Vegas, NV June 14-16, 2002

Friday, June 14, 2002

8:00 AM Ionization WG-3
Device Testing Working
Groups WG-5

1:00 PM Worksurfaces WG-4
Handlers WG-10

Saturday, June 15, 2002

8:00 AM Device Testing Working
Groups WG-5

Footwear WG-9
Work Stations WG-53
Cleanroom Consider-
ations WG-55
1:00 PM Packaging WG-11
Flooring WG-7

Sunday, June 16, 2002

8:00 AM Handtools WG-13
Simulators WG-14
Gloves WG-15
1:00 PM Standards Committee

Standards

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Standards update

Footwear WG-9 reviewed comments to its initial draft document for measuring the electrical resistance of foot grounders.

Handlers WG-10 reviewed comments on its draft technical report on automated handlers, clarifying some of the language and adding some references. The group also discussed future work and will gather information to determine the feasibility of developing a technique for measuring discharge current.

Packaging WG-11 completed work on the draft 541 document and barring any unforeseen technical changes, the draft should be released for publication in the spring. **Two Point Resistance (Packaging) WG-11.13** has acquired a third probe and will begin round-robin testing of the proposed procedure.

Handtools WG-13 has begun initial work on a document covering vacuum

pencils and tweezers. Part of the initial work will include evaluation of any existing documents in the area to avoid duplication of effort.

Simulators WG-14 is concentrating on measurements of ESD fields from simulators and people to help define and document the procedures in its discharge current document under development.

Gloves WG-15 reviewed initial test data utilizing three different probes. The constant contact electrode showed the most reproducible test data and will be evaluated further. The group also is evaluating the effects of pressure and hydration.

Workstations WG-53 worked on several additions to the existing workstation advisory, including trouble shooting guidelines for electrical test failures, discussion of equipotential bonding, conduc-

tive worksurfaces, and periodic verification procedures.

Cleanrooms WG-55 reviewed and edited several potential addenda to the existing technical report, including cleanroom ESD packaging such as tape and reel, matrix trays, and gel packs.

A revision and update of the standards **Glossary** is under way.

On the local scene

Top ten signs

From Kay Adams, local chapters chair, comes these top ten signs that you are a member or an officer of a local ESD chapter.

10. You identify tribo-charging as a bigger problem than an error in your credit card statement.
9. You know why a balloon sticks to the wall and you want to tell everyone you see.
8. When you stop to fill up your gas tank, you know you're in the danger zone
7. Your slate for next year's officers is blank.
6. You find yourself sitting in the local chapter ESD Basics tutorial for the 17th time.
5. You know the Rome 800 headquarters number by heart.
4. Two weeks ago you mailed 60 announcements for tonight's chapter meeting and you have 3 reservations.
3. You know how to correctly spell out ESD (electrostatic discharge)
2. You don't know what grade your youngest child is in.
1. You are very excited that tonight's guest speaker is the local hair stylist doing a demo on static control of hair.



Standards committee honors Weight

During the February standards committee meeting, Ron Gibson, standards committee chair recognized Merle Weight (right) for many years of dedicated voluntary service to the ESD Association standards committee as a working group member, TAS representative and member of the standards committee. Merle recently retired from Unisys, but hopes to continue his volunteer efforts with the Association.

On the factory floor

Everything you ever wanted to know about air ionization

(In case you hadn't already made your mind up about it)

by
Arnold Steinman, MSEE
 Chief Technology Officer
 ION Systems

As many of our high tech industries proceed rapidly along their technology roadmaps, one thing has become clear: the static charge problems will only get worse. Whether the problem is particle attraction, ESD damage to devices, or equipment malfunctions from ESD-related electromagnetic interference, it gets worse as time goes on. The disk drive industry is a good example. With the introduction of the magnetoresistive read (MR) head, a technology barrier was reached due to static charge. The MR head is damaged at very low levels of ESD and manufacturing yields are essentially zero without an extensive static control program. It is just a matter of time before a similar technology barrier due to static charge is found in semiconductors, flat panel displays, or other products.



Arnold Steinman

Solving the static problem

The basic elements of a static control program are well known. The ESD Association has brought them together in the static control program designed for the U.S. military, ESD S20.20. It describes the various grounding and materials issues needed to prevent the *generation* of static charge and to *slow the rate of discharge*.

But, due to triboelectrification, primarily on insulators, it is not possible to completely eliminate charge generation from most workplaces. While eliminating all

non-essential insulators is helpful, there are always insulators present in any work area. Most often they are part of the product (e.g., epoxy device packages and circuit boards), but sometimes they are required for high temperature or chemical processing of the product. Finally, there may be conductors that for some reason cannot be grounded. While S20.20 recommends isolating charged insulators from sensitive product, this is impractical in many work areas.

ESD is a multi-step event. Charge is generated, typically triboelectrically, accumulating on some object. At some later time, a discharge occurs. Ionizers prevent problems that would occur in few seconds or longer from the time of generation of charge to the discharge. Some gas-powered ionizers can reduce the neutralization time to under a second. But ESD damage occurs in nanoseconds. Ionizers cannot prevent ESD that occurs as soon as the charge is generated. Ionizers are not a cure-all for all static problems, but how else are you going to deal with charge on insulators?

Ionizers in the static control program

Ionizers are incorporated in the static control program to solve the problems caused by charged insulators and isolated conductors. Ionizers prevent the *accumulation* of static charge on any object that cannot be connected to ground. The shorter the time that static charge remains on an object, the less likely it is to cause an ESD event or attract contamination. Ionization is recommended only when the other parts of the static control program have failed to produce the desired results in reducing an identified static problem.

If grounding and wrist straps solve the static problem, you stop there. If the static-related losses are still too high, maybe you

add dissipative worksurfaces and flooring. Finally, after you use every grounding method available, you still have a static problem due to charge on insulators that are essential to the manufacturing process or part of your product. Then you use ionizers. They are not a substitute for grounding methods, although they will neutralize charge on conductors that cannot be grounded.

Ionization standards and measurements

The ESD Association issued a standard on air ionization, *ANSI EOS/ESD S3.1-1991*, which was reaffirmed recently with minor editorial changes as *ANSI ESD STM3.1-2000*. It is still the only ionization standard recognized worldwide, and has been referenced in many international static control standards. As a standard test method (STM) it contains only an instrument and test methodology for comparing different systems — or the same system over time. It does not specify required performance, due the variety of conditions under which air ionization is used. However, for a specific application in protecting 100 volt HBM sensitive devices, the static control program S20.20 recommends pulsed DC room ionization systems with less than a +/-150 volt swing, and worksurface ionization balanced to better than +/-50 volts. Discharge times should always be specified by the end user to meet the needs of solving the static charge problem.

The key instrument used in analyzing the effectiveness of air ionizers is known as the *charged plate monitor* (CPM). The CPM has an isolated conductive plate that can be charged to a known voltage. It then measures the time required for the ionizer to reduce the charge to 10% of its initial value. Ion balance, or offset voltage, is measured by momentarily grounding the isolated plate of the CPM in the ionized

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On the factory floor

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Air ionization

area, and then measuring the voltage attained by the plate due to the balance of the ionizer. Steady state DC ionizers will reach a single value of positive or negative balance. Pulsed DC ionizers will have both positive and negative maximum voltage swings. AC ionizers will generally show a single value of offset voltage. This CPM measurement for AC ionizer balance is not accurate because the CPM is too slow to follow the rapid fluctuation of the AC ionizer output. Use of AC ionizers should be avoided in applications with extremely ESD-sensitive components.

Ionizer efficiency is affected by many environmental factors including airflow patterns and nearby grounds. You can always decide to use ionizers on the basis of a horsepower contest, the fastest ionizer wins. But the most important issue is whether the ionizers reduce the static problem or not. This is not a decision made on the basis of a particular device technology. All devices are at hazard to charged insulators at some level. Ionizers are needed to reduce charges on insulators below the critical level for a given device or process. It would not make sense to use wrist straps or dissipative flooring without some testing to demonstrate a reduction in the static problem. Any application of ionizers (or any other static control method) should include testing to show the impact on the static problem, whether it's contamination, ESD damage, equipment lockups, or anything else.

Once a decision has been made to use ionization, it must face the same return on investment (ROI) analysis that should be part of the decision-making process for any static control method. This is critical, because ionizers cost significantly more than wrist straps. Once it has been demonstrated that ionizers reduce or eliminate part of the static problem, and an installation of ionizers has been proposed,

it should be possible to calculate how long it will take to pay back the costs of the ionizer installation. Typically, this payback period is one year or less. In critical ionizer applications, such as protecting MR heads or semiconductor photomasks, the payback might be calculated in days or even from a single ESD event that is prevented. It makes no sense to ask if ionizers are cost-effective compared to other static control methods. Other static control methods do not deal with charge on insulators. The real question should be, what is the cost of not using ionizers to solve a static problem caused by charge on insulators or isolated conductors?

Conclusion

As with most technologies, there has been considerable progress in the design of ionizers over the last twenty years. Specialized ionizers exist for protecting extremely ESD-sensitive components, high-speed industrial web applications, and high quality cleanroom applications among many other applications in electronics assembly, optics, and medical devices. Manufacturers of ionizers have learned to make the best use of the variety of ionization technologies available.

As with any static control method, one should make a decision to use ionization based on the best current knowledge available, rather than relying on information sources about technologies a decade or more out of date, or misinformed consultants. It is hoped that this article has presented information to assist you in making a decision to appropriately use air ionization.

Acknowledgement

The material in this article first appeared in *ESD Today*, the newsletter of the Silicon Valley ESD Society.

Association news

New on the web

If you haven't visited the ESD Association web site recently, today's a good time to log on to www.esda.org and find out what's new.

Online membership roster

Want to find an Association member? Try the online membership roster. An extension of the printed version, the online membership roster is searchable by member name, by company, and by geographic area. Information displayed as the result of a search is the same as that contained in the printed version. It's updated regularly so you have access to the most current information.

Symposium papers

In the members only section, you'll find a selection of downloadable device and design papers from prior EOS/ESD Symposiums. These papers have been selected as key papers contributing to the technology and understanding of ESD.

Technical reports

The ESDA standards activity has prepared a dozen technical reports on standards related ESD topics that are downloadable in PDF format from the members only section.

Accessing the members only section

To access the members only section, you need a password and e-mail address. The first time you visit the members only section, you enter your ESDA membership number, then create your own password and enter an e-mail address. On future visits, enter your password and your e-mail address.

Threshold

Beginning with the July/August issue, *Threshold* will only be available as a downloadable PDF file in the members only section. See Leo G. Henry's column in this issue for more information.

Association news

Second annual charity golf tournament set for Charlotte

The ESD Association will sponsor its second annual, David F. Barber, Sr. Charity Golf Tournament in conjunction with the October 2002 EOS/ESD Symposium.

Held in honor of David F. Barber, Sr., an avid golfer and one of the founders of the Symposium, the tournament will be held Saturday afternoon, October 5 at Charles T. Myers Golf Course in Charlotte, NC. Proceeds from entry fees and from event sponsorships will be directed to a local Charlotte area charity.

In announcing the event, David E. Swenson, golf tournament co-chairman stated, "The tournament is one way in which the Association can give something back to the communities that play host to our annual Symposium. Our first tournament in Portland was very successful and the participants had a fun afternoon."

In order to appeal to participants of all skill levels, the event will be a scramble format. Golfers hit their shots from the position of the best ball in the foursome, including putts on the green.

To add to the fun, there will be hole sponsorships, contests such as longest putt or straightest drive, on-course refreshments, and plenty of prizes. The afternoon event will conclude with an evening barbecue supper at the golf course.

Participants may sign up as individuals or in foursomes. Participation is limited to 144 golfers. Non-golfers may come for only the evening barbecue. Transportation to the golf course from the headquarters hotel will be provided.

Complete information regarding playing in the tournament or sponsoring prizes, events, or holes will be mailed to Association members shortly. Registration and sponsorship forms can also be downloaded from the Association web site at www.esda.org.



Start making your plans now to participate in this annual event. You will not only have an afternoon of fun and relaxation before getting down to the more serious business of tutorials and technical sessions, but you will be helping raise money for a good cause.

Letters to the editor

Correction

In the January/February issue, letters to the editor column, we inadvertently referred to μ -electrodes as mm electrodes in the letter from Niels Jonassen. The final paragraph of the letter should have read as follows:

So we don't know if there is a Paschen-low for μ -electrodes. But I don't see why it shouldn't be possible to find out. But a poor old pensioner cannot do it. At least not alone.

From the Threshold chair

Continued from page 2

Threshold going web-based

ber and an email address. This email address is what we need to notify you of the availability of future issues of *Threshold*. So far (since August 2001), about three hundred of you have logged on. Since there are a little over 1200 of you yet to log on, we have a long ways to go.

We need you to log on to the Members Only section using the email address that you want us to use to send you the newsletter.

Last but not least, let's look at the privacy issue. This is an issue of prime importance to the Association and you, our member. The email address that we obtain from you will be used only as a password on the ESDA web site or for direct communications from the Association, such as announcing the availability of *Threshold* or other activities or events. Your email address will not be sold, rented, traded, or otherwise shared with others. You will find a formal statement of this policy on the ESDA web site.

I would like to thank all of you in advance for your co-operation. I am looking forward to ALL of you logging in to the Members Only section. Remember: To keep aware of all Association news and activities, please go to the ESDA web site and login to the Members Only section (www.esda.org) or just send us your e-mail address (info@esda.org) and you will get your *Threshold* newsletter.

Be happy

Leo G

Institutional Listings

<p style="text-align: center;">ACL Staticide</p> <p>1960 E. Devon Avenue, Elk Grove Village, IL 60007 Tel: 847-981-9212 Fax: 847-981-9278 www.aclstaticide.com</p> <p>Cleanroom products, topical antistats, floor finishes and coatings, static detection meters, monitors, computer cleaning products</p>	<p style="text-align: center;">Flexco</p> <p>1401 E. 6th St., Tuscumbia, AL 35674 Tel: 800-633-3151 Fax: 800-346-9075 www.flexcofloors.com</p> <p>Manufacturer of ESD control conductive and static dissipative solid vinyl tile</p>
<p style="text-align: center;">ESD Systems.com</p> <p>19 Brigham St. Unit 9, Marlboro, MA 01752 Tel: 508-485-7390 Fax: 508-480-0257 www.esdsystems.com</p> <p>A full line of ESD control products: wrist straps/foot grounders/mats/ionizers/floor finish/shielding bags/smocks/ testers & more</p>	<p style="text-align: center;">Wolfgang Warmbier</p> <p>Untere Giesswiesen 21, D-78247 Hilzingen, Germany Tel: 49-7731-86880 Fax: 49-7731-868832 www.warmbier.com</p> <p>ISO 9002 Certified for advice, supply and manufacturing of static control materials and systems</p>
<p style="text-align: center;">Bijl/Barneveld</p> <p>Hermesweg 28, NL-3771 ND Barneveld, Holland Tel: 31-342-490147 Fax: 31-342-416845 Email: info@bijlbarneveld.nl</p> <p>Europe's small but most reputable distributor of ESD Control Products. ISO 9002 certified.</p>	<p style="text-align: center;">Monroe Electronics</p> <p>100 Housel Avenue, Lyndonville, NY 14098 Tel: 716-765-2254 Fax: 716-765-9330 Email: electrostatic@monroe-electronics.com www.monroe-electronics.com</p> <p>Full line manufacturer of static measurement equipment</p>
<p style="text-align: center;">Carmelstat</p> <p>P.O.B. 1468, Haifa 31014, Israel Tel: 972-4-846-6016 Fax: 972-4-846-6958 www.carmelstat.com</p> <p>Manufacturer of ESD thermoplastic compounds for shipping, storage, and inplant handling products</p>	<p style="text-align: center;">Static Solutions, Inc.</p> <p>331 Boston Post Rd. E., Marlboro, MA 01752 Tel: 508-480-0700 Fax: 508-485-3353 www.staticsolutions.com</p> <p>World Wide Mfg. of Industry First ESD-Clean Room Products Monitors/Testers/Coatings, Industry First Products</p>
<p style="text-align: center;">PSSI (Plug-in Storage Systems, Inc.)</p> <p>284-A Racebrook Road, PO Box 928, Orange, CT 06477 Tel: 800-231-5952 Fax: 800-532-2999 Email: info@pluginstorage.com</p> <p>Protective storage cabinets, carrying cases, carts, work benches and seating for handling ESD-sensitive circuit boards and electronic devices.</p>	<p style="text-align: center;">HMS Compounds, Inc.</p> <p>P.O. Box 388, Mansfield, TX 76063 Tel: 817-468-3099 Fax: 817-468-3122 www.hmscompounds.com</p> <p>Manufacturers of Conductive and Static Dissipative Thermoplastic Sheet and Roll Stock for ESD Protection</p>
<p style="text-align: center;">PRF USA, INC.</p> <p>P.O. Box 6505, Carlstadt, NJ 07072 Tel: 201-804-5565 Fax: 201-804-5567 www.esdrubber.com</p> <p>Static Dissipative/ESD Control Rubber Flooring Static Dissipative Floor Mats and Table Mats</p>	<p style="text-align: center;">ALX Technical</p> <p>30 MacIntosh Blvd., Suite 5, Concord, Ontario L4K 4P1 Canada Tel: 905-761-0370 Fax: 905-761-0371 info@alxtechnical.com www.alxtechnical.com</p> <p>Manufactures of ESD and ESD Cleanroom Paper, ESDNotes™ adhesive backed paper and ESD Labels</p>
<p style="text-align: center;">rubberbands.net</p> <p>P.O. Box 75267 Colorado Springs, CO 80970 Tel/Fax: 719-683-2419 www.rubberbands.net</p> <p>Electronic Grade Rubber Bands, mfd. in the USA, vacuum-sealed Antistatic, dissipative, conductive with distributors worldwide</p>	<p style="text-align: center;">Polyflor Static Control Flooring</p> <p>365 Walt Sanders Memorial Drive, Newnan, GA 30265 Tel: 800-852-8292 Fax: 770-252-4894 Email: Fhill@lowandbonar.com www.Polyflor.com</p> <p>Worldwide manufacturer and distributor of ESD control conductive and dissipative vinyl floors available in both sheet and tile.</p>
<p style="text-align: center;">VPI Mirrex Corp</p> <p>1389 School House Road, Delaware City, DE 19706 Tel: 302-836-5950 Fax: 302-836-7571 www.vpicorp.com</p> <p>Manufacturer of ESD thermoplastic materials for the display and protection of static sensitive components.</p>	<p style="text-align: center;">Saint-Gobain Advanced Ceramics</p> <p>1225 Aeroplaaza Drive, Colorado Springs, CO 80916 Tel: 719-637-8734 Fax: 719-380-5591 Email: JB.Lafon@saint-gobain.com</p> <p>Manufacturer of Cerastat™ ESD ceramics products to customers prints: tools, fixtures, wear parts for data storage and other electronic industries</p>
<p style="text-align: center;">RMV ESD Consulting & Testing Services</p> <p>Certified; DVBE; NARTE Certified ESD Engineer on Staff www.esdrmv.com Tel: 925-673-0225</p> <p>ESD Program Leadership and Supplier Materials Evaluation Comprehensive ESD Audits and On Site Seminars/Employee Training Member, American Council of Independent Labs</p>	<p style="text-align: center;">Tek Stil Concepts, Inc.,</p> <p>P.O. Box 67, Haddonfield NJ 08033 800/603-0848 856/428-4464 Fax 856/429-6532 www.tekstilconcepts.com Email: info@tekstilconcepts.com</p> <p>ESD dissipative and conductive vinyl sheet and tile. ESD carpet tile. Interlocking conductive rubber antifatigue mats</p>
<p style="text-align: center;">ProLine</p> <p>12 Rogers Rd., Haverhill MA. 01835 Tel: 978-521-2600 Fax: 975-374 4885 www.1proline.com Email: Bench@1proline.com</p> <p>Manufactures ESD modular and ergonomic workstations</p>	<p style="text-align: center;">Pure Plast, Inc.</p> <p>1261 Balmoral Rd Cambridge ONT Canada N1T 1C4 519-622-0410 gcherry@pureplast.com</p> <p>Manufactures & Supplies Thermoforming PVC & PCT ESD & AntiStat sheet film for the electronic industry</p>

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Institutional Listings

<p>Howell Packaging, Division of F.M. Howell & Company P.O. Box 286, Elmira, NY 14902 Tel: 607-734-6291 Fax: 607-734-8667 Designers & Manufacturers of ESD Protective Packaging, Paperboard & Thermoformed Plastic, In-House Testing</p>	<p>Julie Industries, Inc. 355 Middlesex Avenue, Wilmington, MA 01887-0783 Tel: 978-988-8802 Fax: 978-988-8803 Email: questions@julieindustries.com StaticSmart™ products including carpet, rubber & polymeric flooring, personnel grounding products & materials, ESD workstations and chairs</p>
<p>Desco Charleswater West 3651 Walnut Avenue, Chino, CA 91710 Tel: 909-627-8178 Fax: 909-627-7449 www.desco.com Manufacturer of ESD control products including wrist straps, mats, foot grounders, ionizers, shielding bags, floor finish & more</p>	<p>ITW Electronic Component Packaging Systems 2001 E. Randol Mill Road, Suite 117, Arlington, TX 76011 Tel: 817-277-5004 Fax: 817-277-3453 Static Dissipative & Conductive Shipping & Handling Tubes, Carrier Tape & Reels, JEDEC Carrier Trays, Thermoformed Packaging</p>
<p>Conductive Containers, Inc. 4500 Quebec Ave. North, New Hope, MN 55428 Tel: 1-800-FARADAY Fax: 612-537-1738 www.corstat.com Manufacturer of CORSTAT and ESD protective plastic materials for shipping, storage and inplant handling</p>	<p>Aesops, Inc. 636 S. Glenwood Place, P.O. Box 4119, Dalton, GA 30721 Tel: 800-235-8817 Fax: 706-278-6562 www.aesops.com A full line manufacturer of static control products. Special sizes or shapes... No problem. Buy only what you need.</p>
<p>Vermason Ltd. 1 Avenue One, Letchworth, SG6 2HB, England Tel: +44 1462 672005 Fax: +44 1462 670440 sales@vermason.co.uk Manufacturer of ESD products, owner of Eg® durAstatic® trademarks For more information, www.vermason.co.uk or e9@vermason.co.uk</p>	<p>3M Electronic Handling & Protection Division Tel: 1-800-328-1368 www.3M.com/EHPD Manufacturer of static control permanent flooring, wrist/heel straps, static shielding bags & containers, & testing/monitoring equipment</p>
<p>Richmond Technology/BayStat – An ITW Company 2001 E. Randol Mill Rd., Arlington, TX 76011 Tel: 800-829-2942 817-277-5004 Fax: 817-277-8453 Email: sales@richmond-technology.com ESD films and bags, shielding, DryPack®, CleanPackaging, grounding, wrist straps, heel grounders, work surfaces, floor mats, & monitors.</p>	<p>Work Surfaces Corporation 1-800-553-5015 (USA) Tel: 626-836-3749 Fax: 626-836-8979 www.worksurfaces.com Brass terminus flush mount grounding systems, wrist strap receptacles--bus bars</p>
<p>Brick Container Corporation - Protektive Pak® P.O. Box 548, La Mirada, CA 90637-0548 Tel: 714-994-4140 Fax: 714-994-1377 www.brickcontainer.com Impregnated ESD Corrugated Stock Boxes, Crates, & Foam</p>	<p>Technical Coating International, Inc. 150 Backhoe Road, Leland, NC 28451 Tel: 910-371-0860 Fax: 910-371-0929 www.tciinc.com Manufacturer of ESD Films, Foil Laminates, and Specialty Structures (Barrier, Opaque, Transparent, & Recyclable)</p>
<p>VPI 3123 S. 9th St. PO Box 451, Sheboygan, WI 53082-0451 Tel: 800-874-4240 Fax: 920-458-1368 Email: marketing@vpiflooring.com www.vpiflooring.com Manufacturer of ESD Control Solid Vinyl Floor Tile</p>	<p>Trek Inc. 11601 Maple Ridge Road, Medina, NY 14103 Tel: 585-798-3140 Fax: 585-798-3106 Manufacturer of instrumentation for measuring surface voltage, ionizer performance, and surface resistivity</p>
<p>Kenflex Corporation 460 NE Hemlock, Suite A, Redmond, OR 97756 Tel: 541-923-4765 Fax: 541-923-4190 kenflex@coinet.com Manufactures FLEXCELL®, FLEXSTAND®, FLEXTOTE® circuit board transport and protection units, also on web. For additional information: www.kenflex.com</p>	<p>Desco Charleswater East 90 Hudson Rd., Canton, MA 02021-1407 Tel: 781-821-8370 Fax: 781-575-0172 www.charleswater.com Manufacturer of ESD control products including wrist straps, mats, floor finish, Micastat laminate, shielding bags, & much, much more</p>

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