

News bits

Charity golf tournament

The ESD Association's first ever, charity golf tournament will be held September 8 at Langdon Farms Golf Club, Aurora, Oregon. Proceeds from the event will be donated to Doernbecher Children's Hospital in Portland and the Portland Ronald McDonald Houses.

Contact ESD Association headquarters or visit the ESDA Web site (www.esda.org) for additional information.

Debbie Weggeland named exhibitor liaison

Debbie Weggeland has been appointed to the Association board of directors as exhibitor liaison. She will represent the exhibitor community to the 2001 Symposium steering committee and the ESDA board of directors and will work closely with Scien-Tech Associates. Debbie had previously served in the position until the opening of a new business required her to take a short hiatus.

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2001 Symposium Something for everyone

When the curtain rises on the 23rd annual EOS/ESD Symposium, attendees will find a program featuring "something for everyone." This year's event is being held September 9-13 at the Oregon Convention Center, Portland, Oregon.

Once again programmed in four technical tracks, *Design and Device Technology*, *Factory and Materials*, *System Level ESD*, and *Magnetic Recording*, attendees will be able to customize and concentrate their Symposium experience along their specific areas of interest.

Technical sessions

A record 64 papers will be offered in parallel sessions: *Novel CMOS Devices*, *Design – Process and Device Technology*, *RF ESD Design and Technology*, *Transmission Line Pulsing and Standardization*, *Simulation and Modeling*, *Materials I* and *Materials II*, *Factory Issues*, *Magnetic Recording Heads I* and *Magnetic Recording Heads II*, and *Systems Issues*.

Workshops

Eight interactive workshops will cover *On-Chip Protection*, *How and Why TLP Is Used*, *How TLP Aids ESD Protection Designers*, *ESD Control Program – Audit Problems*, *ESD in Cleanrooms*, *Grounding of People*, *Worksurfaces*, and *Walking Surfaces*, *ESD in Magnetic Recording*, and *System Level ESD Considerations*.

Tutorials

The week's events officially open Sunday, September 9 with four full-day ESD tutorials: *ESD Basics*, *ESD On-Chip Protection in Advanced Technologies*, *Understanding ESD in Magnetic Recording*, and *System Level ESD/EMI Design and Troubleshooting*. An additional 18 tutorials will be offered on Monday and Tuesday. Organized in four educational tracks: *Factory*, *Protection*

Design, *Magnetic Recording and Failure Analysis*, and *Systems and Technology*, the tutorials focus on a wide range of EOS and ESD topics.

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 being offered on Friday, September 14. Special tutorials through the week will help applicants prepare for the examinations.

The detailed program will be mailed in mid-May. It also is 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 Mark A. Kelly, Delphi Delco Electronics Systems. The vice general chair is Steven H. Voldman, IBM Microelectronics. The technical program chair is Joseph Bernier, Intersil Corporation.

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Visit the ESDA web site at
www.esda.org

From the Threshold chair

...And the maintenance of a high professional standing among its members and others

This is the final installment of a theme started in the January/February issue and continuing in the March/April issue. Here, I would like to focus, albeit briefly, on issues related to being a professional, both individually and as a group.

Over the years, the term "professional" has been used quite freely and, in some cases, quite loosely. A quick check of my English/American dictionary (don't ask) says: "*professional: person(s) engaged in or worthy of the high standards of any profession; or person(s) who does something with great skill.*" I am sure that you will agree with me that the ESD Association has attracted a very large



Leo G. Henry

group of ESD professionals who are the best, technically, at what they do. You also will agree that those who perform the administrative tasks also are the best at what they do. We all perform, using great skill, to achieve the high standards that we have set for the electronics industry over the years. This certainly should qualify all of us as a professional group.

We have maintained this high professional standing over the years. This is demonstrated by the numbers of ESD standards that have become accepted by the industry, by the increasing Symposium attendance, and by those who have taken the ESD classes and have be-

come ESDC certified. The growing recognition of the ESD Control Program standard (S20.20) is further evidence of our high standing as a professional organization in the electronics industry.

As we, the ESD Association and our members, move forward to become a fully recognized international entity, our professionalism will be further enhanced. Our goal as members is to work harder to maintain this high standard.

This newsletter is a reflection of our professionalism, so please continue to support your newsletter with submissions for publication. The editor will be happy to consider your professional contribution.

Until next issue, Stay Happy.

Leo G

Threshold

THRESHOLD™ is published six times a year for the members of the ESD Association. The association is a not-for-profit corporation. It strives for the advancement of theory and practice of electrical overstress avoidance and of allied arts and sciences and the maintenance of a high professional standing among its members and others.

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Threshold™ Publication Schedule

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



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EOS/ESD Symposium



Summary Program and Schedule

September 9-13, 2001
Oregon Convention Center
Portland, Oregon, USA

Saturday, September 8

Registration Opens
Charity Golf Tournament

Sunday, September 9

Tutorials

Monday, September 10

Tutorials
Spouse/Companion Portland
City Orientation Tours
Professional and Technical
Women's Reception
Welcome Reception (In Exhibit
Hall)
Exhibits

Tuesday, September 11

Awards Breakfast
Exhibits
Technical Sessions
Novel CMOS Devices
Materials I
Simulation and Modeling
Factory Issues
Magnetic Recording Heads I

Wednesday, September 12

Technical Sessions
Design – Process & Device
Technology
Materials II
Magnetic Recording Heads II

Exhibits

ESD Association Luncheon/
Keynote Speaker
Workshops
Spouse/Companion Tour

Thursday, September 13

Technical Sessions
RF ESD Design & Technology
Systems Issues
Transmission Line Pulsing &
Standardization
Tutorials

Friday, September 14

ESDC Technician Exam
ESDC Engineer Exam

Association news

Lucent becomes first U.S. facility certified to S20.20

Lucent Technologies' Merrimack Valley Works, North Andover, MA has become the first electronics manufacturing facility in the U.S. to be audited and certified according to ANSI/ESD S20.20 ESD Control Program Standard. The formal certificate recently was presented at the facility. From left to right are Steve Halperin, senior vice-president, ESD Association who represented the Association at the presentation; Dominick Cantore, northeast district manager and lead auditor for DNV, the firm that performed the audit; Karen Griffin, director of SIC quality at the North Andover facility; Dave Dunn, general manager, North East System Integration Center; and Ted Dangelmayer, ESD process owner and distinguished member of technical staff, Lucent Technologies.



Make the move towards professional certification

Is it time to advance your career by getting ESDC certified?

Did the ISO auditor mention certified personnel during your last audit? Did the latest RFP “specify ESDC certified personnel” in the bidding specifications?

If all this has got you thinking about professional certification, then the 2001 EOS/ESD Symposium offers you all the opportunity you need to achieve your goal. You can take the certification exam on Friday, September 14. You can also prepare for the exam by attending one or more of the Symposium tutorials that have been designated as examination preparation courses. (See “Symposium Certification Activities” on this page for more details.)

Certification benefits to individuals

- Demonstrates experience, knowledge, and competency
- Encourages self-development and continuing education
- Enhances career advancement and employment opportunities

Certification benefits to employer and industry

- Provides an indication of qualifications for personnel hired to work in static control
- Helps raise the competency level of the entire ESD control field
- Helps assure that the industry has properly trained and qualified personnel
- Improves communications in the procurement and application of ESD control products and services
- Recognized as a plus by ISO 9000 auditors when part of a company’s formal program

Requirements for certification

Although passing the exam is a key step in the certification process, there are several additional requirements.

There are two levels of certification: ESDC Engineer and ESDC Technician. Both require work experience, education, peer endorsement, and an examination.

To become a Certified ESD Control, Engineer, you

- Must have 9 years experience in ESD (Education may be substituted for a portion of experience)
- Submit 3 reference endorsements, including one from a supervisor
- Pass a certification exam
- Submit a list of 10 questions for use in future exams

To become a Certified ESD Control Technician, you

- Must have 6 years experience in ESD (Education may be substituted for a portion of experience)
- Submit 3 reference endorsements, including one from a supervisor
- Pass a certification exam
- Submit a list of 10 questions for use in future exams

If you can’t take the exam at the Symposium, you can arrange to take either exam practically anytime at a location near to you or in conjunction with the Northeast Regional Educational program on June 13 in Tyngsboro, MA

Applying for certification

To apply for certification or to get more information, request an ESDC Certification Packet from ESD Association headquarters. The packet includes detailed eligibility requirements, application forms, a list of study references, and other details. There is a \$24 application fee and a \$25 test fee. There is also an administrative fee associated with the exam. If you take the exam during the Symposium or at one of the RED Programs, this fee is waived.

Additional information also will be available in the Symposium registration area or at the ESD Association booth in the exhibit hall.

2001 EOS/ESD Symposium Certification Activities

Tutorials

Preparing for the Technician Exam

- ESD Basics (Sunday)
- Practical Application of ANSI ESD S20.20 (Monday)
- Electrostatic Fundamentals (Monday)
- In-Plant ESD Survey and Evaluation Measurements (Monday)
- ESD Standards and Procedures (Thursday)
- Electrostatic Measurements (Thursday)
- Air Ionization: Issues and Answers (Thursday)

Preparing for the Engineer Exam

- ESD Basics (Sunday)
- EOS/ESD Failure Models and Mechanisms (Monday)
- Electrostatic Fundamentals (Monday)
- In-Plant ESD Survey and Evaluation Measurements (Monday)
- ESD Standards and Procedures (Thursday)
- Electrostatic Measurements (Thursday)
- Air Ionization: Issues and Answers (Thursday)
- Electrostatic Calculations for the ESD Engineer (Thursday)
- Device Testing (Thursday)

Certification Exams Friday, September 14

- ESDC Engineer Exam
- ESDC Technician Exam

From the president

Spring brings thoughts of Symposium, golf, involvement, facility certification, and Singapore

Finally, spring is here and the weather is changing for the better. With that, can the Symposium be far away? The program for this year is coming together. If you remember the depth of last year's program, then you will have an idea of what Mark Kelly and his team have in store for you this year. There will be something for everyone again.



John Kinnear

get more involved, simply ask. Ask a director. Or ask headquarters. As a personal invitation, feel free to attend the Board meetings. They are usually the last Tuesday of our regular meeting series and are open for you to attend. If there is a portion of the meeting that may be closed due to a sensitive topic, it is only for a short period. If you have any questions, please feel free to talk with me about them.

Other initiatives

I would like to update you on two other initiatives. First, facility certification is moving along. There are now two facilities that have been certified and more that

have inquired about becoming certified. Currently, there is still one registrar, DNV, but others will be coming on board this year. Check with your registrar about their plans to become an ANSI/ESD 20.20 certified registrar.

The ESD Association is also presenting a session in Singapore with CleanRooms/DataStor Asia 2001 the last week in July. As a follow-up to this effort, we are considering a small show in Singapore in 2002. There will be more on this later in the year.

As you can see, there is a lot going on with the ESD Association. If you want to become part of it, just get on "the ladder".

Charity golf tournament

On Saturday, September 8, immediately preceding the Symposium, the ESD Association will host its first charity golf event. Not only will this kick off Symposium week with a little relaxation, but also it will provide an opportunity for friends to get together to have a little fun, to enjoy a dinner together, and maybe to try a sport that they always wanted to do. It also is an opportunity for the Association to give something to the community that is the host for our Symposium. The scramble format allows even first-time golfers to enjoy themselves because the pressure of staying up with the group is not there. Everyone hits the ball from the tee, but the next shot is taken from the point of the best shot of the four golfers. This keeps the game moving and everyone gets to contribute. The Langdon Farms course was selected because it will be a challenge to good players and forgiving to new players. Come and enjoy.

Get involved

To change the subject a little, this issue of *Threshold* and the previous one have contained a series of articles on how you can get involved in the ESD Association. If you want more information on how to

Calendar of events

May 2001

Midwest ESD Regional Tutorial: May 1-2, Motorola Galvin Center, Schaumburg, IL; www.midwestesd.org

ESD Northwest Chapter Meeting: May 9, Continuous Monitoring, Doug Chesleigh, SPI/Westek; Wacker Siltronic, Portland, OR; www.esdnw.org

Texas ESD Association Meeting: May 14, ESD Measuring and Detection Instrumentation, Sematech, Austin, TX; www.CenTxESDAssoc.homestead.com

Silicon Valley EOS/ESD Society Membership Meeting: May 15, Ramada Inn, Sunnyvale, CA, www.esdsiva.org, E-mail: leogesd@pacbell.net

NE Chapter General Meeting: May 16, ESDC Certification and Getting Ready for the NARTE Exam, Ted Dangelmayr, Lucent Technologies; M/A-Com, Lowell, MA; www.nechapteresda.org

June 2001

Northeast Regional Education Program: June 11-13, Boston University Corporate Education Center, Tyngsboro, MA. www.esda.org, www.nechapteresda.org

ESDC Certification Exams: June 13, Boston University Corporate Education Center, Tyngsboro, MA. www.esda.org, www.nechapteresda.org

Silicon Valley EOS/ESD Society Pizza Party: June 19, Ramada Inn, Sunnyvale, CA, www.esdsiva.org, E-mail: leogesd@pacbell.net

July 2000

ESD Northwest Chapter Meeting: July 11, Julian Montoya, Intel; www.esdnw.org

Moving up the ESDA ladder, part 2

**“What ESDA participation did for me”
..and what it can do for you**

by
Ed Weggeland
Vice President

In the last issue of *Threshold*, I told you about how ESDA is organized into volunteer activities and I asked you to become



Ed Weggeland

more involved and participate in an activity. Basically, I told you about what you could do for ESDA and how you could progress up the leadership ladder.

Now, I'd like you to read about what ESDA can do for you, aside from what you can read about in our membership literature explaining benefits.

My reality research consisted of surveying colleagues who have been active in ESDA and who have grown into leadership positions. My question was simple, "What has your active role in ESDA done for you both personally and professionally."

Here are their responses. Close the door, grab a cup of coffee, put your feet up and read not only about what ESDA active participation could do for you, but also what ESDA continues to do for any participants.

"It has allowed me to learn about how other ESD engineers do their job, to meet

the entire world population of ESD Engineers that has been fruitful for dialog, discussion, learning and friendship."

"It has gained me significant recognition among my peers and my employer."

"As I grew in position, it allowed me to take a broader view and gave me the opportunity to think more strategically."

"The positions that I held gave me the opportunity for terrific experiences that I am extremely proud of."

"I consider the ESDA to be the home of most of my closest friends."

"Helped me to learn all that I wanted to."

"ESDA offered many advantages in education, industry knowledge and personal exposure."

"I learned by hanging around with others that shared a common interest in static control and ESD. They were generous and shared their experience, knowledge and practical applications of solutions."

"My Association work provided an insight as to industry's basic needs and solutions to problems."

"I learned about device, system, magnetic media, RF, materials testing, advanced services, product suppliers and a wide range of factory issues."

"I learned how to work as a team member and gain company support to make things happen."

"I learned how to perform in jobs in an effective responsible manner, which required personal development of communication skills."

"It taught me how to work with a broad number of people from all corners of the industry, military and international organizations."

"I developed many friendships over the years that I cherish."

"My work with ESDA gave me the opportunity to do many things that I could not do in my own company."

"My ESDA management roles served to broaden my personal skills and knowledge while giving me management opportunities and experience that would not ordinarily be available."

"The ESDA process of personal growth, practical management experiences and participation in different business and technical areas prepared me to work at much higher levels of industry."

"It taught me how to communicate effectively with others at every level of the industry."

"I can now speak in front of large groups and not be nervous."

"It taught me how to make effective presentations, and get decisions."

"I joined a standard working group to assure that there was an industry standard to measure the performance of ionizers. *Trust me it works* was not good enough."

"It honed my skills to become an effective trainer."

I have developed managerial and analytical skills not associated with my technical background.

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Moving up the ESDA ladder, part 2

"It gave me the opportunity to pass my knowledge on to others."

Improved my ability to work as a team.

"I learned how to coordinate the efforts of people with diverse technical, marketing interests and agendas."

"I learned how to introduce new ideas and taking responsibility for areas of technical knowledge that were not being addressed by other organizations."

"It satisfies my employer's requirement that its high-ranking technical contributors gain some outside exposure and recognition in the commercial community."

"I have certainly come to understand the meaning of the word *dedication*."

"It gave me the opportunity to build an extensive professional network."

"It gives me great industry visibility."

"It gives me credibility towards customers because of my involvement in standards, workshops, educational and symposium activities."

"It gives me management experience."

"It is fun, an addiction."

"Improved my ability to work as a team."

"Taught me new critical strategic thinking."

"Gives me both company and industry recognition."

"I find it exciting to see a conversational idea developed, put into motion and be-

come a successful program, for others to learn."

"I feel good realizing that my small contribution makes a difference."

"I am proud to have developed and implemented several successful ESDA programs."

"Instilled confidence that I could do much more than I thought I was capable of."

"Met people from all over the world and learned about other cultures."

"Learned how to maneuver through sensitive issues."

"Have a much better understanding of long range planning."

"Learned how to work as a team member after always being in charge."

"Identified necessity to choose issues that are really important and not get emotional about things that are less important."

"Has given me and my company international visibility that I could not have achieved without participation."

"Given me self confidence."

"Helped me to be more assertive."

"I have learned more about ESD than I ever could have learned working by myself."

"I have developed technical contacts that help me when I have technical questions."

"I have developed managerial and analytical skills not associated with my technical background."

"I learned organizational skills."

"I have developed a small business's mentality and a good general ability to manage entire business programs."

"My volunteer job allowed me the opportunity to appreciate the perspectives of others."

"It gave me the opportunity to think outside the box."

"I gained realization that listening is key to self-improvement."

"I learned to be humble and accept total responsibility for all actions."

"I learned that the input from other volunteers is extremely important to form well-informed and useable opinions."

Well, there are the expressions of what ESDA does for others—your industry colleagues, friends and associates—and can do for you. From learning about the technology of EOS/ESD or establishing and maintaining information networks through professional skill development, active participation can and will be rewarding to you both professionally and personally.

The next time you attend a meeting series or the Symposium, look for the people who display the plastic name tags with our association logo and ask them how you can contribute and receive. Contact Association headquarters with your desire and they will direct you to one of us who wants to help you become involved.

It taught me how to communicate effectively with others at every level of the industry.

Voltage of insulators?

Have you ever seen somebody point a static voltmeter toward a tote box and pronounce it to have a voltage of 2 kV? Or maybe you have even done so yourself. Well, unless the box is conductive the exercise is meaningless.

With one very special exception, an insulating body does not have a voltage. More precisely, you can not meaningfully define a quantity with the dimension of voltage to characterize a charged insulator. Again with one very special exception.

I've been teaching this fact for years without much notice or objection. When the physics was explained, the fact was accepted. But when I touched upon the same theme in a previous issue of THRESHOLD I sure got a reaction. Like I had been using foul language. My statements were



Niels Jonassen

absurd and I knew better etc, etc. Let's try to analyze the situation and start with the **one** case where it makes some sense to talk about the voltage of an insulator.

Surface potential of electrets and photodrums

Figure 1 shows a plane piece of an insulating material with the thickness d , backed by a grounded conductor. The insulator has the permittivity ϵ and is uniformly charged by a charge density σ ($C \cdot m^{-2}$).

Let's first assume that we have no other charged items and no conductors in the neighborhood. The field strength inside the insulator is then

$$E = \frac{\sigma}{\epsilon}$$

and the surface potential, $V_{s,0}$ of the insulator is

$$V_{s,0} = E \cdot d = \frac{\sigma}{\epsilon} \cdot d$$

If you now place a field meter at a distance x from the charged material you may read a field strength, E_x . If you have taken proper precautions so that this field is not distorted (for instance by surrounding the field meter sensor by a screen parallel to the sample), you will have

$$E_x = \frac{\sigma}{\epsilon \frac{x}{d} + \epsilon_0}$$

where ϵ_0 is the (vacuum) permittivity valid for the space between the sample and the fieldmeter. The surface potential is now

$$V_{s,x} = \frac{V_{s,0}}{1 + \frac{d}{\epsilon_r x}}$$

where ϵ_r is the relative permittivity of the charged material

It appears that if $d < x$ then

$$V_{s,x} \approx V_{s,0}$$

and the undisturbed surface potential can thus be reasonably accurately determined.

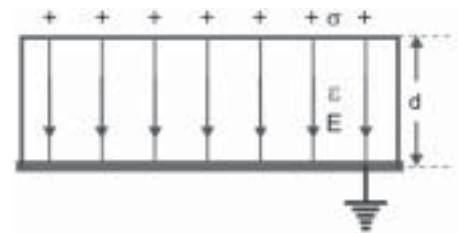
The situation described above corresponds to a uniformly charged electret or a charged photodrum, and probably also a few other similar situations, where you have a thin uniformly charged insulator backed by a grounded conductor.

In **such** cases it makes good sense to talk about the **surface potential** of the charged insulator. The surface potential may also be measured directly by a non-contacting static voltmeter, where you bring the sensor up to such a voltage that there is zero field between the meter and the charged surface.

It should be emphasized, however, that the surface potential of an insulator is by nature very different from the voltage of a charged, insulated conductor

Let's look again at our charged piece of insulating material, Figure 2.

Figure 2



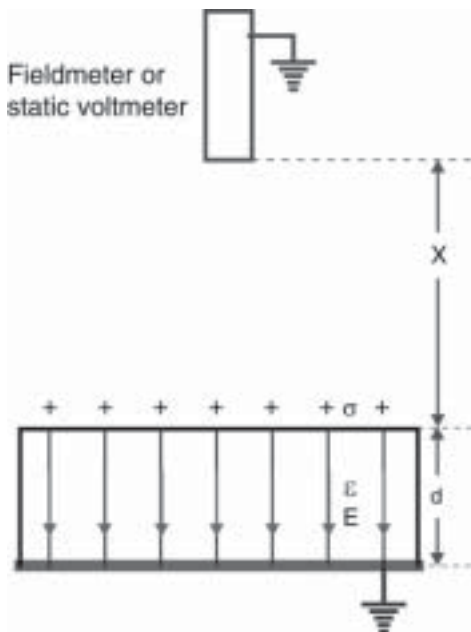
The field inside the insulator represents a (field) energy with the density ($J \cdot m^{-3}$)

$$w = \frac{1}{2} \epsilon E^2 = \frac{\sigma^2}{2\epsilon}$$

In Figure 3 we have shown the same piece of material, only in this case we have established the same field as in Figure 2 by placing a metal plate A with the

continued on page 9

Figure 1



Uniformly charged, uniformly thick plane insulator, backed by grounded conductor

continued from page 8

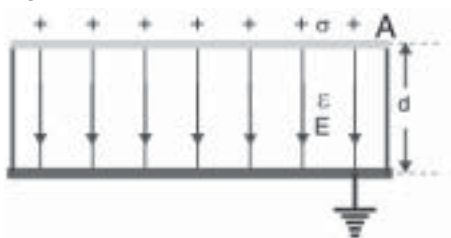
Voltage of insulators?

same total charge Q on top of the insulator. The plate A thus has the potential given by

$$V_{s,o} = \frac{\sigma}{\epsilon} \cdot d = \frac{Q}{\epsilon S} \cdot d$$

where S is the charged area.

Figure 3



The field inside the insulator, in Figure 2 as well as in Figure 3, represents a total (field) energy

$$W = Sd \frac{\sigma^2}{2\epsilon} = \frac{1}{2} \cdot \epsilon S \cdot V^2$$

An insulator has no capacitance

We recognize the factor

$$C = \frac{\epsilon S}{d}$$

as the capacitance of a the plate capacitor in Figure 3, and this similarity has sometimes led to the misunderstanding of ascribing a capacitance to a charged insulator.

This is a misunderstanding for two reasons:

- 1 Only in the very specialized case discussed above is the surface potential proportional to the total charge on the insulator, and
- 2 Not even in this specialized case does the total field energy represent an energy that can be released in a discharge from the charged object, as is the case with a charged conductor, as in Figure 3.

To sum up, the concept of surface potential has its uses when you want to characterize uniformly charged (thin) insulators backed by a grounded conductor.

Ordinary insulators, tote boxes, plastic sheets etc.

Now I can almost hear the few remaining readers say:

“This stuff with formulas is all very good, but tell us why we cannot measure the voltage of our tote boxes, floor coverings etc!”

OK, Let’s look at Figure 4

We have an item, let’s say a plastic box, P, which may or may not be charged.

In the situation shown it is resting on a grounded conductor.

We have placed a field meter at a position A, at a distance x from the plastic box and at a height y from the ground.

Let’s assume x = 0.1 m, and that the field meter reads 30,000 V/m, a fairly low and often encountered field strength when dealing with charged insulators.

Why then isn’t the voltage of the box

$$V = 30,000 \times 0.1 = 3,000 \text{ V?}$$

Well, if you move the field meter around a bit and you keep x constant but change y, then you’ll normally find that the field and hence your calculated “voltage” changes. That is true, too, if you move your field meter to position B or to any other position.

And the same thing is true if you use a compensating non-contacting voltmeter.

You may read an alleged “voltage” directly, but you will find said quantity changes with the positioning of the meter. Therefore, there is not a (i.e. **one**) voltage of the box.

More importantly, even if you managed to get your box charged in such a way that the “voltage” would be more or less the same for a range of placings of the meter, there’s nothing you could use this quantity for.

Let’s say you are working with components or circuits sensitive to voltages at 1 kV. Does that mean you should avoid insulators like the one above, where the field strength times distance is 3 kV? That last question is completely meaningless.

The 1 kV sensitivity of the components refers to the **voltage** of a charged conductor, while the measurements of the box refers to a **field strength** from a charged insulator. (And even when you are using a compensating non-contacting voltmeter, which gives the reading in volt, the function is based on a reaction to a field strength.)

So to return to the “completely meaningless question” posed above:

There is no way you can be sure your components are safe (or endangered) by measuring the field from charged insulators and calculate (maybe done by the instrument) a “voltage” of the insulator.

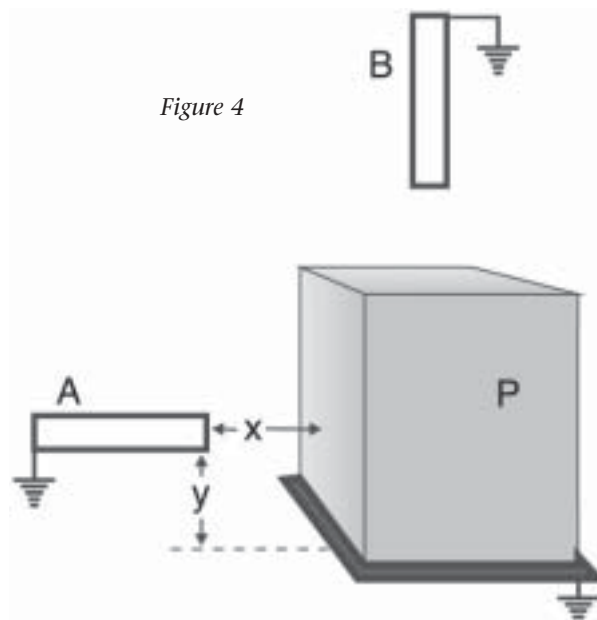
Charge density on insulators

But it must be possible to get some useful information out of the combination of a charged insulator and a field meter.

If you bring your field meter closer to the surface of the charged insulator (let x

continued on page 10

Figure 4



Mr. Static*continued from page 9***Voltage of insulators?**

decrease, Figure 4), you will (sometimes) find that at small distances the field strength, E , is independent of the distance.

In this situation you have a charge density σ ($C \times m^{-2}$) on the insulator given by

$$\sigma = \epsilon_0 E$$

By moving the field meter around you will thus be able to scan the surface and get an impression of the charge distribution. It should be stressed that if you're dealing with a thin sheet of material, this will only give you the charge density "seen" by the field meter, but not tell you whether the charge is on the front or on the back side or on both. And even with more bulky items, like the box in Figure 4, a charge on the far side may interfere with your reading.

Of course the total charge on any item (conductors as well as insulators) may be measured by a Faraday pail. But that's a different story, which has been told many times.

Conclusion

In almost all walks of life, at home and at work, we are surrounded by insulators, which often get charged. In a tiny little fraction of these cases, the charged insulator may be characterized by a surface potential. This is the case with uniformly charged electrets, photodrums and possibly a few other implements or set-ups.

But in the vast majority of charged insulators it makes no sense to talk about a voltage.

This is the situation with plastic sheets, floor coverings, tote boxes, wafer carriers etc. Or to put it shortly, all the cases of charged insulators outside the special fields mentioned above.

So without oversimplifying matters:

With a charged insulator you may measure the charge density (or total charge) but don't ever think in terms of voltage or capacitance.

*Mr. Static***The local scene**

Northeast Chapter meetings cover a variety of topics, and sometimes include facility tours such as this "standing room only" visit to Thermo Keytek in Lowell, MA

Northeast Chapter Recommitment fosters resurgence

One of the challenges facing most volunteer organizations is that of rejuvenation. When you recognize and evaluate the situation early enough, the action plan can be one of rededication and recommitment rather than resuscitation.

Founded in the mid 1980s as one of the earliest local ESD organizations, the Northeast Chapter saw a need a couple of years ago to "rally round the flag." Meeting attendance was declining and most of the attendees were vendor sales staffs. There was an apparent lack of enthusiasm in chapter activities.

The remedy was one of reorganization and rededication, starting with the chapter's board of directors. Chapter president Ted Dangelmayer cites "getting the right people on the board" was a critical step. "We wanted a 50-50 split between end user and vendor on the board. And, we wanted self-starters with high energy levels."

With a strong, active commitment from each of its board members, the chapter is now experiencing a resurgence of activity and enthusiasm. Each board member

has committed to bring 5 people to each meeting with the result that attendance at its four meetings per year is up and more end users are attending. A recent meeting and tour hosted by Thermo KeyTek was standing room only.

Membership has grown to nearly 80 and represents a balance between end users and vendors. Most of the membership is concentrated in the Boston area, but there are a few members in surrounding states as well.

Seeing a lot of membership interest in professional certification, the chapter is co-sponsoring a regional educational development program with the ESD Association this year. Scheduled for June 11-13, the program includes 2 days of ESD tutorials, followed by the ESDC certification exams on the third day.

"Our charter is one of bringing education and technology to the area," Ted continues. "The recent commitment by the board and by our members is allowing us to do that." For more information on the Northeast Chapter, visit the chapter Web site at www.nechaptersda.org.

Institutional Listings

<p style="text-align: center;">Compass Concepts, Inc. 467 Forbes Blvd., South San Francisco, CA 94080 Tel: 415-583-4244 Fax: 415-583-9564 Distributor of ESD flooring</p>	<p style="text-align: center;">Computer Designs, Inc. 5235 West Coplay Road, Whitehall, PA 18052 Tel: 610-261-2100 Fax: 610-261-2800 www.CDI@computer-designs.com Static Dissipative Thermoformed Package Design & Mfg. ESD Protective Clamshells & Stackable Shipping Trays</p>
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