



## February Meeting:

### Determining the Impact of Static Control Methods

By **Arnie Steinman** Chief Applied Technologist, MKS, Ion Sys.

Arnold Steinman is Chief Applied Technologist for MKS, Ion Systems, Alameda, CA, responsible since 1983 for many of the design concepts of the company's ionization static control products. He holds four patents covering air ionizer technology. Steinman graduated from the Polytechnic Institute of Brooklyn, receiving both BSEE and MSEE degrees.

Steinman is a member of the Board of Directors of the ESD Association and a past chairperson of the Ionization Standards Committee WG3.

#### Abstract:

Many ESDA standards test a property of a static control method, rather than showing the effect of using the method on production problems. This presentation discusses how to determine if using a static control method has any impact on static problems, Focusing on production equipment, it includes test methodologies for ESD damage to Ics and contamination affecting semiconductor yields. It references existing test and performance evaluation methods, rather than proposing new methods, emphasizing that normal production testing is the best source of information regarding the impact of static control methods. A calculation of static control impact on yield will be done using an industry standard model.

Topics to be covered:

1. Problems caused by static charge – ESD damage, Contamination, and Equipment Malfunctions
2. Existing static control standards – testing the properties of materials
3. Determining the impact of a static control method on production yield – necessity and difficulties
4. Examples of yield studies for factory-wide ESD control methods.
5. Narrowing the focus – modern production in equipment
6. Test Methods to determine the impact of a static control method in equipment
  - A. Final test of ICs
  - B. Particles per wafer pass testing of contamination
7. Examples of yield analysis for contamination control.
8. Conclusion

### September Meeting

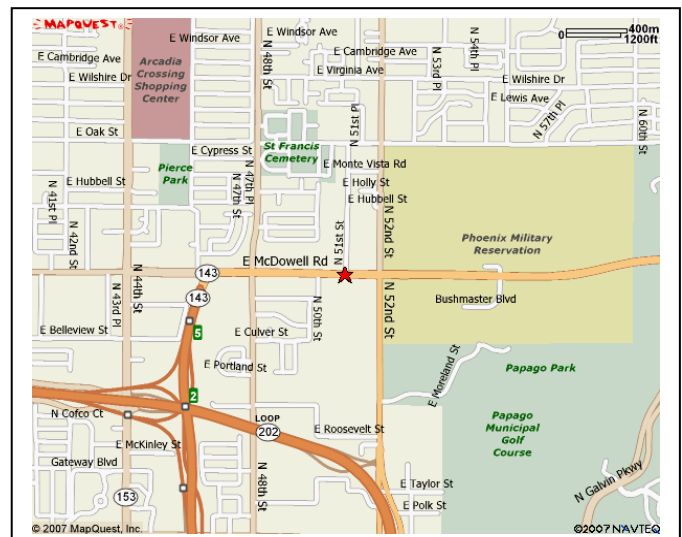
Date: Tuesday, February 26, 2008

Time: 6:30 p.m. Sign in & Social  
7:00 p.m. Speaker  
8:30 p.m. Close of meeting

Dinner Cost: Refreshments will be provided.

Location: **ON Semi Conductor** (See map below)  
5005 E McDowell Rd  
Phoenix, AZ 85008  
Ph: 602 244 3748

Please **RSVP by Wednesday, February 20** at our website at [www.southwestesd.com](http://www.southwestesd.com) or call Chris Back at (602) 822 - 4229 (work), e-mail: [christopher.back@honeywell.com](mailto:christopher.back@honeywell.com).



## Presidents Corner:

Last meeting held this past September was a success. Thanks to the great support from the BoD (Board of Directors) and ON-Semi Conductor for the use of their facility. Meeting attendance for Toni Gurga's presentation "Why Bad ESD Happens to Good Chips" improved from the previous meeting..

I would like to take this time to thank the following sponsors for supporting the Southwest ESD association, by their advertising, providing a meeting location and/or providing beverages/snacks at our meeting.

- **Advanced Foam & Packaging, Inc**
- **Botron Co. Inc**
- **Static Solution Inc.**
- **ON Semi Conductor**
- **HISCO**

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If you are interested in Advertising or providing sponsorship please visit our web site or contact any of the BoDs. The Southwest ESD association needs your support to continue operating and providing membership service.

### **Wanted: Speakers/Presenters**

It is important to provide quality ESD presentation about, process controls, products, services and training to our members. If you are interested in doing a presentation or know of someone who would like to please contact any of the BoDs listed or email me.

Thank you  
Ron Roden  
President Southwest ESD Association

## **FREE Membership Continued**

Southwest ESD Association BoD voted to continue free membership for 2008. If you're not a member please take this opportunity to join by going to our website at [www.southwestesd.com](http://www.southwestesd.com). If you need more information about membership please contact Chirs Back, (ph: 623-266-0877) membership chair or any of the Board of Directors listed on the last page.

### **EVENTS:      Symposiums/Conferences:**

The following ESD events are provided by the National ESD Association for more information and registration, please visit their website at [www.esda.org](http://www.esda.org)

- 2/21/08 Tutorials, For Program Managers, Westin La Paloma, Tucson, AZ.
- 4/21-4/22/08 Classes for Professional Certification, ESD Association Headquarters, Rome, NY.
- 9/07-9/12/08 Annual Symposium, Westin La Paloma, Tucson, AZ.

## **Check Your ESD Protective Products**

*Adapting ANSI/ESD S20.20 for factory auditing leads to an effective in-house ESD control plan*

Looking at some past ESD articles and I came across this article that I believe would be of interest to our members. This article was published in *Compliance Engineering 2005 Annual Reference Guide, written by Will De La Isla, product manager for DESCO Industries Inc (Marlboro, MA).*

I'm not reprinting the entire article due to its length and the limited space in our news letter. **\*\*Note:** *This article was written at the time of ANSI/ESD 20.20-1999.*

Say a person buys a luxury car, spends tens of thousands of dollars on it initially, and then never takes it in for an oil change. Most of us would say that this is a poor way to treat an expensive piece of equipment. Likewise, some manufactures purchase expensive ESD-protective products and then are content to simply use them, feeling confident that they are working correctly. This is a very foolish practice. If ESD-protective products are not properly installed and periodically audited to verify performance, they can fail And failures can be expensive.

A well-designed ESD control program can help ensure a return on the investment in it by providing performance and maintenance schedules for ESD products. The ESD Association guides the user in designing an ESD control program via ANSI/ESD S20.20.<sup>1</sup> The document titled "Development of an Electrostatic Discharge Control Program" covers the requirements necessary to design, establish, implement, and maintain an ESD control program. When properly employed, the program "protects electrical or electronic parts, assemblies, and equipment susceptible to ESD damage from human body model (HBM) discharges greater than or equal to 100 V."

S20.20 is very versatile. However it requires a written ESD control plan. The plan must incorporate several components that are key to its success. These include having a training plan a compliance verification plan, and a specified technical requirement range. And while the ESD Association program is very good, it lacks practical advice on particular tasks. Importing S20.20 guidelines into a factory setting can preserve ESD product usefulness and safety. This article present advice for daily implementation of a control plan into a factory.

### **Compliance Verification**

The S20.20 plan requires formal audits and certifications with certain requirements as well as the need to select test equipment. It also state that periodic verifications should be performed. The procedures are set out in section 6.1.3.

Section 6.1.3.2 recommends that external and internal audits be performed by both the user and the supplier of the ESD-sensitive products. It advises that routine checks should be performed "based on the control item usage, its durability, and associated risk of failure."

However, these sections do not offer concrete timetables for periodic checks. A successful plan requires user to set verification checks at sufficient intervals. Most user will accept the recommended range set forth by S20.20 Table 1 as their ESD protective product technical requirements. Any deviation from ESD's Table 1 requires justification. As the document states, "tailoring decisions, including rationale, shall be documented in the ESD Control Program Plan."

### Latent Defects

ESD-protective products are sometimes installed incorrectly, and sometimes they fail to meet the technical requirement range. There are two types of ESD damage: catastrophic failure and latent defects. By definition, normal quality control inspection can catch catastrophic failures. However, these inspections are considerably less effective when detecting latent defects.

Latent defects include a variety of complications such as partial degradation, as explained in ESD TR20.20 section 2.7.2. Partial degradation means that the product may continue to perform its intended function but experiences severely reduced operating life. Latent defects that cause premature failure can lead to costly repairs and, in some case, pose a serious hazard to employees and other users. That is what makes shipping products with latent defects a far scarier, not to mention more expensive, situation.

The detection technology used now offers little protection against latent defects, especially once the products are assembled. Some studies have indicated that products shipped with latent defects exceed the number of products shipped with catastrophic failure.

Experts estimate the cost of ESD damage at billions of dollars annually. The ESD Association's Web site, [www.esda.org](http://www.esda.org), explains "the cost of damaged devices themselves ranges from only a few cents for a simple diode to several hundred dollars for complex hybrids. When associated costs of repair and rework, shipping, labor, and overhead are included, clearly the opportunities exist for significant improvements. "In lieu of

these, following a control plan can reduce problems created by latent effects.

### Conclusion

ANSI/ESD S20.20 is a process document providing guidelines for an ongoing ESD-control program. Auditing and periodic checks ensure that the ESD-protective products meet the technical requirement range. If used effectively, companies can turn ESD control programs into a competitive advantage a strategic tool focused on quality, productivity, and customer satisfaction improvement.

*\*\*Please be aware this article was written back when ANSI/ESD 20.20-1999 was in effect however the requirements are still applicable in the revised ANSI/ESD 20.20-2007, the requirements still exist just rewritten differently and reformatted.*

### References

1. ANSI/ESD S20.20: "Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)," ESD Association (ESDA), 1999
2. Compliance Engineering 2005 Annual Reference Guide, written by Will De La Isla, product manager for DESCO Industries Inc (Marlboro, MA).

### Board of Directors Meeting (BOD)

Board of Directors meetings are held periodically, members are welcome to attend. Meetings will be posted on our web sites home page.

## 2008

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### Programs

<u>Date</u>	<u>Location</u>	<u>Speaker/ Presentation</u>	<u>Presentation</u>
<b>February 26<sup>th</sup> Tuesday</b>	<b>ON Semi Conductor</b>	<b>Arnie Steinman / ION Systems</b>	<b>Determining the Impact of Static Control Methods</b>
March – TBD	TBD	TBD	TBD
April – TBD	TBD	TBD	TBD

Southwest ESD Association