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NEW YORK

June 13-15, 2017 EOS/ESD Association, Inc. Tutorials
June 13-14 ESD Program Development & Assessment (ANSI/ESD S20.20 Seminar)
June 15 ESD Certified Professional Program Manager Exam
EOS/ESD Association, Inc., 7900 Turin Rd. Bldg 3, Rome, NY 13440

December 4-5, 2017 EOS/ESD Association, Inc. Tutorials
Dec 4 FC170: ESD Training for Internal Auditors and Supplier Quality
Dec 5 FC164: Costly Controversial ESD Myths
FC161: Perfect ESD Storm
EOS/ESD Association, Inc., 7900 Turin Rd. Bldg 3, Rome, NY 13440

CALIFORNIA

June 28-29, 2017 EOS/ESD Association, Inc. Tutorials
June 28 DD110: ESD From Basics to Advanced Protection Design
June 29 FC 170:ESD Training for Internal Auditors and Supplier Quality Engineers
DD100: ESD Circuits
DD/FC130: System Level ESD/EMI: Testing to IEC and Other Standards
Plaza Suites Hotel, 3100 Lakeside Drive, Santa Clara, CA, USA

CHINA

November 8-10, 2017 EOS/ESD Association, Inc. Tutorials
Nov 8 FC100: ESD Basics for the Program Manager
Nov 9 FC101: How To's of In-Plant ESD Auditing and Evaluation Measurements
Nov 10 Essentials for ESD Programs Factory: Technologies • Controls • Procedures
Canmax, 99 Shuangma Street, Suzhou Industrial Park, Jiangsu, China

VIETNAM

November 14-16, 2017 EOS/ESD Association, Inc. Tutorials
Nov 14 ESD Basics
FC155: ESD Control Workstations: Set-up, Practical Considerations & Measurements
Nov 15 FC101: How To's of In-Plant ESD Auditing and Evaluation Measurements
Nov 16 FC150: Hands-on ESD Measurements & Instruments-Uses and Pitfalls
FC361: Ultra-sensitive (Class 0) Devices: ESD Controls & Auditing Measurements
Saigon Prince Hotel, Ho Chi Minh City, Vietnam

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2017 EOS/ESD Association, Inc. Tutorials

June 13-15, 2017

EOS/ESD Association, Inc., 7900 Turin Rd. Bldg. 3, Rome, NY 13440

June 13-14, 2017
8:00 a.m. - 5:00 p.m.

FC340: ESD Program Development & Assessment (ANSI/ESD S20.20 Seminar) Certification: PrM

Instructors David E. Swenson, Affinity Static Control Consulting, LLC; Kevin Duncan, Seagate Technology

The S20.20 Seminar is intended to bring all the aspects of the Program Manager Curriculum to a final focal point. The concepts of electrostatic control are discussed within the context of designing, implementing and maintaining an effective ESD control program plan that meets the requirements of the standard. Preparing a documented ESD Control Program Plan that can withstand a 3rd party ISO9000 Certification Body assessment is a major element of the certification process. Students are required to participate in numerous activities in this seminar to help acquaint them with the concepts involved in designing an ESD control program plan.

The following topics are covered in this course:
Overview of ANSI/ESD S20.20
How to approach an assessment
Administrative elements
ESD program assessment
ESD program techniques for different applications
Technical elements
Overview of the assessment process
The audit checklist and follow-up questions

June 15, 2017
8:00 a.m. - 5:00 p.m.

ESD Certified Professional Program Manager Exam

The Program Manager Certification program is intended for individuals who are involved in designing, implementing, managing, and auditing ESD control programs in their facilities.

The steps needed to achieve Program Manager Certification are:
1. Register for Certification Program.
2. Attend all of the 10 pre-requisite courses.
3. Pass an in-depth examination.

NOTE: You must initiate an official file in your name at EOS/ESD Association, Inc. headquarters, and complete all pre-requisite courses to be eligable to take the exam. ***Exam fee applies***

For information visit: www.esda.org/certification/esda-professional-program-manager/

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2017 EOS/ESD Association, Inc. Tutorials

December 4-5, 2017

EOS/ESD Association, Inc., 7900 Turin Rd. Bldg. 3, Rome, NY 13440

December 4, 2017

8:30 a.m. - 4:30 p.m.

FC170: ESD Training for Internal Auditors and Supplier Quality

Ron Gibson, Advanced Static Control Consulting; John T. Kinnear, IBM Corporation

This class has been designed specifically for those individuals who are responsible for:

Performing internal company ESD assessments based on ANSI/ESD S20.20
Conducting a pre-assessment of their facility prior to an external 3rd party assessment
Assessing the ESD control programs of their suppliers

This course will use the checklist used by ESDA certified auditors as the basis for the class. However, this class will delve into the meaning behind each of the audit checklist questions in greater detail than is currently found in either the ESD Association registrar certification training or the ANSI/ESD S20.20 ESD program design seminar. After taking this class the student will be able assess a process and determine whether or not it meets the requirements of ANSI/ESD S20.20-2014.

Note: Familiarity with performing assessments is recommended for anyone planning on taking this course.

December 5, 2017

8:30 AM - 12:00 PM

FC164: Costly Controversial ESD Myths

Ted Dangelmayer, Dangelmayer Associates LLC

There are a number of common misunderstandings and controversies about electrostatic discharge (ESD) program management that can have significant impact on the implementation and maintenance of the ESD program. These misunderstandings or "myths" result in unnecessary expenditures and/or result in a compromise of the program integrity. These myths and controversies, such as latency are often cited by skeptics not wanting to adhere to certain standard ESD procedures. As a consequence, it is important to identify and dispel the myths as well as to understand the potential impact of latent failures.

This tutorial highlights 10 common myths and supporting success studies as well as a success study on latency. The myths and success studies presented here were chosen to provide real-world examples of how an ESD program can be strengthened by understanding the fallacy in each of the myths. This understanding will result in more reliable products that are also more cost competitive. Although not a myth, latency it is a significant reliability consideration that is surrounded with controversy. Some experts will argue that latency is virtually non-existent and others will claim that it is the dominant failure mode. Reality lies somewhere in between. The Latency study cites irrefutable evidence of latent failures in alarming proportions that must be factored into ESD programs and product design.

1:00 PM - 4:30 PM

FC161: Perfect ESD Storm

Ted Dangelmayer, Dangelmayer Associates LLC

Learn how to prepare for the "Perfect ESD Storm" that is brewing in the electronics industry. The trend towards extensive use of ultra-sensitive components (Class 0) and the widespread lack of CDM (Charged Device Model) understanding are brewing the "Perfect ESD Storm." It is no longer business as usual, and it can take up to two years to prepare. This tutorial is intended for professionals who have a basic understanding of ESD but are not fully aware of CDM control techniques or the industry trend toward extremely sensitive devices and the counter measures that are necessary. Learn the answers to your questions as well as these examples. Are you skeptical about this news of a Class 0 trend? Is it really happening? Is it likely to be a problem in your factory? How big a problem is CDM in manufacturing? What is different about CDM controls? How do I tailor Ansi/ESD S20.20 for CDM and Class 0? Join us for this highly interactive tutorial and learn why this is inevitable and how to prepare for it.

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2017 EOS/ESD Association, Inc. Tutorials

June 28-29, 2017

Plaza Suites Hotel, 3100 Lakeside Drive, Santa Clara, CA, USA

June 28, 2017

8:30 a.m. - 4:30 p.m.

DD110: ESD From Basics to Advanced Protection Design

Instructor: Charvaka Duvvury

Certification: DD

This course gives a comprehensive overview from ESD basics to ESD design principles covering up to latest advanced silicon technologies; appealing to a variety of engineers from design to process technology, and from product engineers and failure analysis engineers to quality engineers. The attendee will have an in-depth understanding of the principles of ESD device design along with a full perception of what it takes to address almost every kind of design scenario, how to apply rules of thumb for successful design, knowledge of lessons learned from case studies, and empowerment to communicate with customers on ESD quality issues. The course will also include a brief overview of interaction between component ESD design and system level ESD protection strategies.

This class qualifies for Device Design Certification curriculum. Details available at www.esda.org/certification/.

June 29, 2017

8:30 a.m. - 4:30 p.m.

FC170: ESD Training for Internal Auditors and Supplier Quality Engineers

Instructor: John Kinnear, IBM

This class has been designed specifically for those individuals who are responsible for: Performing internal company ESD assessments based on ANSI/ESD S20.20 Conducting a pre-assessment of their facility prior to an external 3rd party assessment assessing the ESD control programs of their suppliers

This course will use the checklist used by ESDA certified auditors as the basis for the class. However, this class will delve into the meaning behind each of the audit checklist questions in greater detail than is currently found in either the ESD Association registrar certification training or the ANSI/ESD S20.20 ESD program design seminar. After taking this class the student will be able assess a process and determine whether or not it meets the requirements of ANSI/ESD S20.20-2014.

Note: Familiarity with performing assessments is recommended for anyone planning on taking this course.

8:30 a.m. - 12:00 p.m.

DD100: ESD Circuits

Instructor: Eugene Worley, Qualcomm

This tutorial will focus on a number of clamp approaches including BigFETs or RC clamps, snap-back NFETs, diodes, SCRs including HV SCRs, low capacitance clamps methods including those for MOSFET based LNAs and RF transceiver switches, and cross domain clamping. Spice simulations and simple models where applicable will be used to design and analyze circuit performance. Models include HBM, CDM, and IEC sources, gate pull requirements for dynamically lowering snap-back thresholds, and diodes. Gate pull for snap-back NFETs will include cascade and stacked NFETs. The need for NQS MOSFET models will be discussed with respect to CDM simulations. Operational characteristics of diodes will be examined including simple models and turn on delay. Diode types to be examined include STI, gated, and gated with LDD block. Protecting RF transceiver switches will be studied and will include spice simulations and design of low capacitance snap-back NFETs. Cross domain analysis will feature SPICE-based gate oxide rupture models and design requirement for secondary clamps including secondary clamps for LNAs.

1:00 p.m. - 4:30 p.m.

DD/FC130: System Level ESD/EMI: Testing to IEC and Other Standards

Instructor: Jeffrey Dunnihoo, Pragma Design

Certification: PrM

This tutorial is intended to help those tasked with testing products system level ESD standards by providing first an overview of how real-world system ESD events are simulated in different standards and testers in general, and then provide detailed information on IEC 61000-4-2, the most widely used standard. This introduction will highlight the similarities and differences between IEC, ANSI, Telcordia, and some automotive ESD standards. We will answer common questions regarding test setups, test points, and procedures, and address key issues, including: 1) Differences between “verification” and “calibration” and when is each required, 2) Test equipment requirements, the test environment, ground connections, return paths and ground plane effects. 3) Testing procedures on actual products, how the tester and procedure affects test results, and problems with test result variations due to simulator influences. 4) Definitions of testing failure criteria for the product. 4) What points need to be tested and why, guidance on determining “operator accessible” points and ports, exempted points and ports, and what to do around connectors and connector pins. 5) ANSI and other ESD standards, the drive toward harmonization with IEC, the scope of different standards and why they are unlikely to converge. This system level ESD tutorial will cover different perspectives on ESD as applied to electronic systems from the user’s, the designer’s and even the designer’s competitor’s points of view.

This class is a requirement of the ESDA Program Manager Certification curriculum. Details on the Professional Certification Programs offered by ESDA are on our website at www.esda.org/certification/.

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2017 EOS/ESD Association, Inc. Tutorials

Nov 8-10, 2017

Canmax, 99 Shuangma Street, Suzhou Industrial Park, Jiangsu, China

Nov 8, 2017

8:00 AM - 5:00 PM

FC100: ESD Basics for the Program Manager Certification: PrM

Instructors: Ginger Hansel, Terry Welsher, Dangelmayer Associates LLC

This tutorial provides the foundation material for understanding electrostatics and ESD and their role in the manufacturing and handling of ESD sensitive devices. The fundamental properties of charge, electric fields, voltage, capacitance, and current are discussed with a view towards understanding key electrostatic phenomena and electrical processes. These include charge generation and decay, material properties, and induction. An overview of device failure mechanisms is presented, including how these models impact ESD control programs. Finally, the course provides an overview of ESD control procedures during handling and manufacturing and an overview of ANSI/ESD S20.20 program requirements. This full day course is required for those in-plant auditors and program managers who are working toward professional ESD certification. The presentation includes many in-class demonstrations, videos, and animated slides.

Some sample topics covered in this course are:

- Definitions and relationships among important electrical and mechanical properties
- Causes of charge generation and decay
- Field effects and voltages
- Role of capacitance in ESD (Q=CV)
- Overview of key measurements including common pitfalls of some measurements
- Review of ESD failure models
- Understanding and demonstrating electrostatic induction
- Utility and limitations of air ionization
- Basic goals of ESD controls
- Properties of effective ESD control products and materials
- Overview of ANSI/ESD S20.20 ESD program development requirements

Nov 9, 2017

8:00 AM - 5:00 PM

FC101: How To's of In-Plant ESD Auditing and Evaluation Measurements

Certification: PrM

Instructors: Ginger Hansel, Terry Welsher, Dangelmayer Associates LLC

Compliance verification is one of the most important elements of ESD program management and there are many technical and administrative pitfalls that can be avoided. The attendee will learn not only how to make valid auditing measurements in accordance with ESD TR53 – Compliance Verification of ESD Protective Equipment and Materials, but also how to recognize and avoid common pitfalls. Common instruments will be explained as well as the invalid test results that can result when they are used incorrectly. Advanced auditing techniques will also be covered that enable Class 0 devices to be handled successfully. There are many ways to administer effective Compliance Verification programs. Two successful examples will be presented that were developed independently by different companies. Hidden administrative pitfalls that often result in poor compliance will also be discussed. This tutorial will be highly interactive with live demonstrations, in-plant photographs, and compelling video clips. Students will be encouraged to ask questions and to participate in the discussions.

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2017 EOS/ESD Association, Inc. Tutorials

Nov 8-10, 2017

Canmax, 99 Shuangma Street, Suzhou Industrial Park, Jiangsu, China

Nov 10, 2017

8:00 AM - 5:00 PM

Essentials for ESD Programs
Factory: Technologies • Controls • Procedures

Instructors: Ginger Hansel, Terry Welsher, Dangelmayer Associates LLC

This one-day ESD Essentials seminar is a companion to the Basics and How To's seminars and provides concentrated versions of the remaining 8 tutorials in the ESDA program manager (PrM) certification program:

- Ionization and Answers for the Program Manager
- Packaging Principles for the Program Manager
- System Level ESD/EMI: Testing to IEC and other Standards
- Cleanroom Considerations for the Program Manager
- Device Technology and Failure Analysis Overview
- Electrostatic Calculations for the Program Manager and the ESD Engineer
- ESD Standards Overview for the Program Manager
- ESD Program Development & Assessment (ANSI/ESD S20.20 Seminar)

Key concepts and information from the above courses have been selected for this focused, one-day seminar. Examples of electrostatics and ESD calculations are included where appropriate throughout the seminar.

Essential ESD technical areas are reviewed such as air ionization, ESD-safe packaging, cleanroom principles, and electrostatic attraction. Standards relevant to these areas are described.

Very simple and basic ESD protection circuit concepts and relevant failure analysis techniques are introduced and reviewed.

The final section includes charge generation test methods, additional ESDA standards, system level ESD standards and testing, practical auditing techniques and strategies, and ESD event detection.

The tutorial concludes with a review of ESD protected areas (EPAs), ESD program management and the application of ANSI/ESD S20.20.

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EOS/ESD Association, Inc. Tutorials

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November 14-16, 2017

Saigon Prince Hotel

Ho Chi Minh City, Vietnam

NOVEMBER 14, 2017

ESD Basics

8:30 a.m. - 12:00 p.m.

Instructor: Terry Welsher, Dangelmayer Associates LLC

This tutorial provides the foundation material for understanding electrostatics and ESD and their role in the manufacturing and handling of ESD sensitive devices. The fundamental properties of charge, electric fields, voltage, capacitance, and current are discussed with a view towards understanding key electrostatic phenomena and electrical processes. An overview of device failure mechanisms is presented, including how these models impact ESD control programs. Finally, the course provides an overview of ESD control procedures during handling and manufacturing. The presentation includes in-class demonstrations, videos, and animated slides.

Some sample topics covered in this course are:

- Definitions and relationships among important electrical and mechanical properties
- Causes of charge generation and decay
- Electric fields and voltages
- Role of capacitance in ESD (Q=CV)
- Review of ESD failure models (CDM and HBM)
- Understanding and demonstrating electrostatic induction
- Utility and limitations of air ionization
- Properties of effective ESD control products and materials

ESD Control Workstations: Set-up, Practical Considerations & Measurements (FC155)

1:00 p.m. - 4:30 p.m.

Instructor: Ginger Hansel, Dangelmayer Associates LLC

The complexity of properly installing workstations is often underestimated, On the 'surface' it appears to be a simple installation of an ESD static dissipative mat or ESD hard laminate. However, there are important issues learned from years of experience that impact cost, durability, ESD performance, maintenance, and compliance verification. A good ESD control workstation is the cornerstone of ESD Program Management (EPM). Workstations used in processing ESD susceptible items are intended to maintain a near zero potential by providing ground paths for basic components of the workstation and a connection point for personnel grounding apparatus. The workstation should provide protection from CDM (Charged Device Model) ESD as well as HBM (Human Body Model). This practical tutorial will teach you how to set-up an effective ESD controlled workstation that accomplishes these goals. It will cover selection and qualification of the required materials and how to install them correctly. Other workstation issues will be discussed including: application of ionization, garment grounding, ESD chairs, handling containers, tools and compliance verification consistent with ESD TR53.

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EOS/ESD Association, Inc. Tutorials
Ho Chi Minh City, Vietnam, November 14-16, 2017

NOVEMBER 15, 2017

How To's of In-Plant ESD Auditing and Evaluation Measurements (FC101)

8:30 a.m. - 4:30 p.m. **Certification: PrM**

Instructors: Terry Welsher, Ginger Hansel, Dangelmayer Associates LLC

This program reviews the evaluation and periodic verification (audit) measurement procedures for the technical requirements specified in the ANSI/ESD S20.20 ESD program development standard. Detailed explanation of instruments, fixtures, and accessories function and usage are provided. Then, the details of "How to" measure are explained and demonstrated. Measurements include those listed in Table 1: Grounding/Equipotential Bonding Requirements; Table 2: Personnel Grounding Requirements; and Table 3: EPA/ESD Control Items. These recommended measurement procedures confirm the proper operation and use of ESD control products and materials selected as part of a facility's S20.20 ESD control program.

Some sample topics covered in this course are:

- ANSI/ESD S20.20 Technical Control Requirements
- Program Manager's Approach to Instrumentation and Applications
- Testing Ground Circuits and Assessing Connections
- Essential Resistance Measurement Procedures and Concerns
- Electrostatic Field and Voltage Measurements
- Personnel Grounding Considerations vs. ESD Control Points
- Product Installation Baseline Measurements
- Evaluation, Acceptance, and Audit Procedures for: Ground Systems, Floors, Worksurfaces, Equipment, Personnel Grounding, Garments, Materials, Production Aids, Packaging, and Ionization Devices
- Electrostatic Analysis Measurements including Worksurface Suppression, Footwear/Flooring, and Ionization Decay

This class qualifies for Program Manager Certification. Details at www.esda.org/certification/.

NOVEMBER 16, 2017

Hands-on ESD Measurements & Instruments-Uses and Pitfalls (FC150)

8:30 a.m. - 12:00 p.m.

Instructor: Ginger Hansel, Dangelmayer Associates LLC

Accurate data is the foundation of effective ESD program management. This hands-on tutorial will explain and demonstrate the proper use of ESD test equipment such as static locators, resistance meters, charge plate monitors, and event detectors. We will examine pitfalls of using these common instruments that can result in an incorrect representation of the ESD risk. For example, static locators can give misleading readings if the effects of voltage suppression are not taken into account. We will also discuss the effective use of ionization since ionizers that are not measured, maintained, and located correctly may contribute ESD hazards to the work area. Each student will participate in class exercises to perform these tests. The hands-on experience is the best way to understand the seriousness of the pitfalls and the benefits to taking the proper precautions. What you learn will help you avoid frequent auditing problems and improve your compliance verification program.

ESD Controls for CDM and Ultra-Sensitive Devices and Circuit Boards (FC361)

1:00 p.m. - 4:30 p.m.

Instructor: Terry Welsher, Dangelmayer Associates LLC

Advanced ESD Controls and Auditing Measurements for Charged-Device Model (CDM) and ultra-sensitive (Class 0) devices and circuit boards are not well known and there are many technical and strategic pitfalls that must be avoided. This tutorial presents practices which address these issues. The CDM and similar events such as Charge-Board Event (CBE) and Cable Discharge Event (CDE) will be described. Industry definitions (threshold levels) for Class 0 will be described and the history of their use reviewed. Students will learn the additional controls and measurements that are needed for CDM and Class 0 devices; how to avoid common pitfalls; and how to use data successfully. Advanced measurements will be described including event detection and high speed current measurements. Students will learn when each measurement type is useful. Compelling case studies will illustrate these techniques and the success they produce. Examples of SOPs (Special Operating Procedures) developed for specific applications will also be discussed.

This tutorial is highly interactive with live demonstrations, in-plant photographs, and video clips. Students are encouraged to ask questions and actively participate in the discussions. References to technical literature on CDM and ultra-sensitive devices will be included.

2017 EOS/ESD Association, Inc. Tutorials

About the Instructors:

Ted Dangelmayer is the president of Dangelmayer Associates, LLC and has assembled an ESD consulting team consisting of the foremost authorities in virtually all ESD areas of both product design and manufacturing. He received the "Outstanding Contribution" award and the EOS/ESD Association "Founders" award. He was president of the EOS/ESD Association, chairman of the ESDA standards committee, and general chairman of the EOS/ESD Symposium. He has published two editions of his book, ESD Program Management, numerous magazine articles, and technical papers. Ted holds three patents and is iNARTE certified. He is currently president of the Northeast local chapter of the ESD Association and a member of the education committee.

Kevin Duncan is currently the corporate ESD program manager for Seagate Technology located in Bloomington, MN; where he has been actively involved in ESD at Seagate since 2005. He is responsible for controlling factory level ESD processes in the ultra-sensitive Slider, head gimbal assembly (HGA), head stack assembly (HSA), and drive manufacturing, and research and development locations. Kevin has been a member of the ESD Association since 2000 and is currently a member of the board of directors, education committee, standards committee, and technical program committee. He serves as the factory certification chair, computer based training chair, working group chairman for WG 3 – ionization, and participates in several other working groups. Kevin has also been presented with the Joel P. Weidendorf award for recognition of his significant contributions, service, leadership, and achievements in the field of EOS/ESD standards development. Kevin is a technical expert of the United States National Committee, where he represents the United States participating in International Electrotechnical Commission (IEC) Technical Committee 101 – Electrostatics. He currently serves as convenor of maintenance teams 7 - Ionization and 9 - Flooring. He is an ESD certified professional program manager and an iNARTE certified ESD engineer.

Jeffrey Dunnihoo is the founder of Pragma Design in Austin, Texas, specializing in interface design architecture and ESD, EOS, and other transient analysis. Pragma's engineering services are based on decades of experience in I/O ASIC and serial bus interface protection and design. Pragma Design's current PESTO online ESD simulation tool implements the Industry Council's System Efficient ESD Design methodology which is used in Littelfuse's iDesign simulation tool. Jeff has presented at IEEE EMC, ESDA, ISTFA and has recently co-authored a new textbook with other ESD experts on ESD Co-Design fundamentals. He has also been a contributor to industry groups and standards bodies such as USB, IEEE 802.11, VESA/DisplayPort, the ESD Industry Council and has served in systems and testing working groups of EOS/ESD Association, Inc.

Charvaka Duvvury was a Texas Instruments fellow while he worked in the silicon technology development group. Charvaka is also a fellow of the IEEE. He is working as a technical consultant on ESD design methods and ESD qualification support. Charvaka received his PhD in engineering science from the University of Toledo. After working as a post-doctoral fellow in physics at the University of Alberta in Canada, he joined Texas Instruments, where he worked for more than 35 years. Charvaka has made numerous international presentations on ESD phenomena and protection design. He has published over 150 papers in technical journals and conferences and holds 75 patents. He has co-authored books on ESD design (ESD In Silicon Integrated Circuits, John Wiley & Sons, 2nd Edition 2002), hot carriers, and modeling of electrical overstress. He recently co-edited and authored System Level ESD Co-Design, John Wiley 2015. He is a recipient of the Outstanding Contributions award from the EOS/ESD Symposium (1990), Outstanding Mentor award twice from the SRC (1994 and 2012), and numerous best paper and best presentation awards from the EOS/ESD Symposium. He also received the IEEE Electron Devices Society Education Award (2013). He served twice as General Chair for the EOS/ESD Symposium during 1994 and in 2005. He was a contributing editor for the IEEE Transactions on Device and Materials Reliability (TDMR) from 2001 to 2011. Charvaka has been a member of the EOS/ESD Association board of directors since 1997, promoting university education and research in ESD. He is a co-founder and co-chair of the Industry Council on ESD Target Levels.

Ron Gibson is the president of Advanced Static Control Consulting (ASCC), which was founded in 2010. ASCC provides consulting, ESD material and product qualification, and develops ESD training programs for clients. From 1994 to 2010 Ron was the corporate ESD program manager for Celestica International, Inc. and was responsible for the ESD control programs at all of Celestica's factories worldwide. From 1979 to 1994 Ron worked for IBM. Ron co-authored IBM's initial factory ESD standards. Ron has been a member of the ESD Association (ESDA) since 1988, and has served as an officer in the positions of president, senior vice president, vice president, secretary, and treasurer. He has also served as chairman of the ESDA Standards Committee (STDCOM) for over 10 years and as the first chairman of the ESDA certification business unit. Gibson is an iNARTE certified electrostatic discharge control engineer, an ESDA certified instructor for the program manager certification program, and is a certified chief ESD coordinator for the Reliability Center of Japan.

About the Instructors: Continued

Ginger Hansel joined Motorola's Semiconductor Products Sector in 1981 as a Test Process/Equipment Engineer to analyze and improve manufacturing operations. She founded and led the manufacturing ESD control team that trained, audited, qualified materials, and established innovative solutions throughout the semiconductor sector. Under her leadership, the team reduced a 40% failure rate in one test operation to almost zero through the targeted introduction of specific ESD control materials and ESD Awareness training. Ginger brought ESD awareness to her other roles as Engineering Section Leader, Technical Training Manager, QA Engineer, Business Metrics Engineer, Data and Document Control Manager, Program Manager and Technical Product Marketing Manager. Ginger retired from Motorola/Freescale in 2004 and became Director of Marketing and Program Management with the ESD consulting group, Dangelmayer Associates. She has published numerous magazine articles and technical papers on effective ESD control programs and awareness training; examples include "The Production Operator: Weak Link or Warrior in the ESD Battle" and "Cost Effective Failure Analysis Method for Detecting Failure Site Associated with Extremely Small Leakage". She has taught seminars, workshops and webinars around the country and abroad. For over 35 years, Ginger has held leadership positions in the EOS/ESD Association such as President, Board of Directors, Chair of the Education Business Unit and has served on the Steering, Technical Program, Standards, and other committees. She is currently the Senior Vice President of the Association and Chair of the Services Business Unit Group. Ginger initiated the NARTE ESD Certification in 1992 and is a certified ESD Control Engineer. She is currently on the Board of Directors for the Texas ESD Association. Ms. Hansel received a BS in Natural Sciences (Psychology) and a BS in Electrical Engineering Technology, both from the University of Houston. She received her MBA (Executive Option II program) from the University of Texas.

John Kinnear is an IBM senior engineer specializing in process & system technology, and facility certification in accordance with ANSI/ESD S20.20. He has a BS degree from University of Buffalo and a MS degree from Syracuse University. John is well known globally for his technical contributions to national and international standards. He has been the IBM ESD site coordinator for the Poughkeepsie site since 1989. He is past chairman of the IBM inter-divisional technical liaison committee for ESD protection and is an important member of his company's committee to develop and implement the ESD corporate program for IBM. John has coordinated the testing of large mainframes for compliance to EMC, safety, environmental, shipping, and volatile organic emission standards. He has also been the lead engineer on testing large mainframe systems to EMC emissions and immunity standards for FCC, CE Mark, VCCI, and other national requirements. As a member of the ESD Association since 1990, John has served in several standards development committees as well as association management positions. John is the appointed technical adviser to the United States National Committee/IEC technical committee 101, where he represents the United States to the International Electrotechnical Commission (IEC). In this position he assisted in the evolution of international ESD standards and supports international adoption of ANSI/ESD S20.20. As chair of the ESDA's facility certification (ANSI/ESD S20.20) development program, John played major roles in the program's development and industry launch. In particular, John coordinated the initial development of lead assessor training, ISO registrar certification, and witness audits. John has served in every ESD Association officer's position, including vice president, senior vice president, and president. He is the past chairman of the EOS/ESD Symposium technical program committee and past general chairman of the 2004 EOS/ESD Symposium. For his contributions to the ESD Association, John was presented with the Outstanding Contribution award in September 2006.

Jay Skolnik PE, CPI, CPM, a Licensed Professional Electrical Engineer, is the co-founder and Lead Engineer / Consultant of Skolnik Technical Training in Albuquerque, NM. With over thirty years of experience in the electronics industry, Jay has developed a multitude of products utilized in different industries, including military, defense, avionics, aerospace, commercial, industrial, medical, automotive, and sports entertainment. As an ESDA Certified Program Manager, Jay teaches ESD mitigation and control for the electronics & energetics specialties. He performs ESD audits to ensure factories and laboratories are following safe ESD control guidelines and procedures. He is also certified by iNARTE and is a Certified Professional Instructor of National Instruments (NI). He received his Electrical Engineering degree from the University of Missouri-Rolla.

David E. Swenson retired in 2003 after 35 years of service from 3M. While at 3M he had responsibility for new packaging material development and application, training of 3M personnel worldwide and providing application assistance to users of static control products globally with particular emphasis on Asia Pacific and Japan. Dave and his wife Geri established a new company, Affinity Static Control Consulting, L.L.C .in 2003. Dave has been a member of the ESD Association since 1984 and has served in many capacities including 1997 Symposium General Chair and president of the Association in 1998 and 1999 and again in 2008 and 2009. He was re-elected to the Board of Directors for a 5th term from 2014 to 2016. Dave was presented with the highest award of the ESD Association, the "Outstanding Contributions Award" in 2002, the Standards Committee "Joel P. Weidendorf Memorial Award" in 2004 and the Association "Edward G. Weggeland" Memorial Award in 2014. He is a member of the Standards Committee and the ANSI/ESD S20.20 Standard Task Team and is chairman of the Packaging and Grounding working groups. Dave also serves as Treasurer and Information Liaison of the Texas Chapter of the ESD Association; he is a member of the Electrostatic Society of America, the UK Institute of Physics and is a US Expert to IEC TC101, Electrostatics. In addition, he is the convener of Joint Working Group 13 between TC101 and TC40 (Electrostatics and Capacitors and Resistors). He can be reached at 512-244-7514 and at static2@swbell.net.

About the Instructors: Continued

Dr. Terry L. Welsher retired from Lucent Technologies-Bell Laboratories Engineering Research Center in 2001, as the director of the quality, test, & reliability department. He began his career in Bell Labs in 1978; where he worked on electrical conduction mechanisms in insulating polymers and electrolytic corrosion failure mechanisms in electrical interconnection materials. In 1984, he was appointed distinguished member of technical staff for his work in these fields. In 1986, he was promoted to technical manager to re-constitute the Bell Laboratories core expertise in electrostatic discharge (ESD). The newly formed group proceeded to produce a string of ground-breaking contributions to the field and played a key role in advancing industry standards. In 1994, he broadened his group's activities to all aspects of hardware reliability for Lucent Technologies with special emphasis in environmental stress testing (EST) and product reliability prediction and planning. In 1997, he was promoted to director of the quality, test & reliability center of excellence where he directed the development and deployment of product quality, test and reliability assurance practices for Lucent Technologies business units. This work included design for testability of integrated circuits, board and system level test and diagnosis and special techniques for testing of RF and optoelectronic systems and components. After leaving Lucent, he became reliability director for LaserSharp Corporation, an optical fiber laser amplifier company, where he was responsible for product quality, reliability, and compliance. Since 2004, he has been senior vice president of Dangelmayer Associates, LLC, an EOS/ESD consulting firm. Dr. Welsher was chairman of the ESD Association standards committee 1988-1989. He was technical program chair in 1991, vice general chair in 1992, and general chair in 1993 of the EOS/ESD Symposium. He served as member of the Symposium board of directors 1993-1995. He has also been active in quality standards and road mapping activities with Sematech, the EOS/ESD Association, and the JEDEC 14 quality and reliability committee. He served on the board of directors of JEDEC 1999-2001. He is currently co-chair of the joint JEDEC/ESDA HBM and CDM ESD working groups, and member of the Board of Directors and Past President of the EOS/ESD Association. Recently, he has led the effort to harmonize and merge JEDEC and ESDA device testing standards. He holds a BS in chemistry from Florida State University and a PhD in chemical physics from the University of Texas at Austin. He is author or co-author of fifty papers in solid state physics, applied mathematics, organic chemistry, electronics reliability, and electrostatic discharge. For his contributions to the ESD Association, Terry was presented with the Outstanding Contribution award in September 2016.

Eugene Worley received the MSEE degree from the University of California at Berkeley in Solid State Electronics. His career has included IC circuit design, semiconductor device characterization, and reliability physics on such technologies as CMOS, CMOS SOI, Flash Non Volatile Memory, and GaAs. He is presently a principle engineer at Qualcomm working on the design and characterization of ESD clamps for LNA's, RF power amplifiers, power management circuits, analog circuits, and advanced digital circuits. For a number of years he worked on ESD at Conexant/Rockwell as a distinguished engineer and has been a member of the ESDA since 1991. His ESDA activities have included being a member of the TLP Standards Committee, workshop moderator for 3 years, workshop panelist for 6 years, session chair for 5 years, Technical Program Committee member for over 12 years, and IEW seminar chair. He has published papers in the IEEE Transactions on Electron Devices, IEEE Electron Device Letters, IEEE J. of Solid State Circuits, Solid State Electronics, the Technical Digest of the International Electron Devices Meeting, the EOS/ESD Symposium Proceedings, Journal of Electrostatics, and the IEEE Transactions on Nuclear Science. He has also reviewed papers for the IEEE Transactions on Electron Devices, the Journal of Electrostatics, and the IEEE Transactions on Device and Materials Reliability. He is a member of Tau Beta Pi, Eta Kappa Nu, and Phi Kappa Phi.

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