# EOS/ESD Manufacturing Symposium in Malaysia

## Penang Skills Development Centre
## 1 Jalan Sultan Azlan Shah, 11900 Bayan Lepas, Pulau Pinang, Malaysia
## October 14th-17th 2019
## October 18th Program Manager Exam (optional)

Co-Sponsor

- The ANSI/ESD S20.20 Standard and official ANSI/ESD S20.20 Facility Certification Program was developed and is maintained by EOS/ESD Association, Inc.

- The ESD Program Manager Professional Certification was developed and is maintained by EOS/ESD Association, Inc.

- EOS/ESD Association, Inc. instructors who developed the ANSI/ESDA and IEC ESD Standards bring you today's current information and developments.

The EOS/ESD Association is organizing the EOS/ESD Manufacturing Symposium Malaysia. The EOS /ESD Manufacturing Symposium in Malaysia is focused on discussing issues and providing answers to electrostatic discharge in electronic production and assembly.

**Management Chair:**
**Junjun Li, IBM Corporation**

**Local Chair/co-Chair:**
**Marcus Koh, Everfeed Technology Pte Ltd**
**Bernard Chin, Qorvo**

*2019 EOS/ESD Manufacturing Symposium China*

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September 3, 2019 11:46 AM

# EOS/ESD Manufacturing Symposium in Malaysia

# Schedule

## WEDNESDAY OCTOBER 16, 2019

*9:00 AM - 9:30 AM* — *Welcome*

*9:30 AM - 10:00 AM* — **1.1 How Do I Get My Manufacturing Site ANSI/ESD S20.20 Certified**
*Bernard Chin, Qorvo; Marcus Koh, Everfeed Technology Pte. Ltd.*

*10:00 AM - 10:30AM* — **1.2 ANSI/ESD S20.20 Tailoring for ESD Seating**
*Intan Fazliana Osman, TienShin Lee, Benchmark Electronics*

*10:30 AM - 11:00 AM* — Coffee Break - exhibits open

*11:00 AM - 11:30 AM* — **1.3 Electronic Parts and Electrostatic Discharge (ESD) - Gaps and Mitigation Stratgeies Updates**
*Shri G. Agarwal, NASA - Jet Propulsion Laboratory*

*11:30 AM - 12:00 PM* — **1.4 ESD Control Misconceptions and Incorrect Applications**
*Albert Khoo, GK Yeoh, Charles Ratnam, ESD Consulting*

*12:00 PM - 1:00 PM* — Lunch Break

*1:00 PM - 1:30 PM* — **1.5 Mitigating EMI-Caused Electrical Overstress (EOS) in Manufacturing**
*Vladimir Kraz, OnFILTER*

*1:30 PM- 2:00 PM* — **1.6 Managing Electrical Overstress (EOS) in Electronic Manufacturing**
*Vladimir Kraz, OnFILTER*

*2:00 PM - 2:30 PM* — **1.7 AHE Grounding Considerations: Low to High Frequency**
*Marcus Koh, Everfeed Technology Pte. Ltd.*

*2:30 PM - 3:00 PM* — **1.8 Smock & Human Body Grounding through Wrist Straps**
*Maurice Goh, UMS Singapore; Bernard Chin, Qorvo*

*3:00 PM - 3:30PM* — Coffee Break - exhibits open

*3:30 PM - 4:00 PM* — **1.9 Other Industry Practice – Garment Fabric Evaluation**
*Tay, Chin Siang, Suzhou TA&A Ultraclean Technology Co., Ltd.*

*4:00 PM - 4:30 PM* — **1.10 Good ESD Control Cleanroom Nitrile Gloves**
*Heng King Wey, CE Technology Berhad*

*4:30 PM - 5:00 PM* — **1.11 Polyurethane and Epoxy Based Floor Coatings and Sealings Meet the Latest ESD-Standards**
*Gerhard Kraus, StoCretec GmbH Kriftel,*

## THURSDAY OCTOBER 17, 2019

*9:00 AM - 9:30 AM* — **2.1 EOS/ESD in IC Manufacturing Process of GQFN 64L Device**
*Bernard Chin, Qorvo; Marcus Koh, Everfeed Technology Pte. Ltd.*

*9:30 AM - 10:00 AM* — **2.2 Automated Real-time System for Prediction and Detection of ESD Parametric Failures in Non-tested Parts**
*Ray Nicanor Tag-At, Ma. Venus M. Gambito, Merryl Mabias, Western Digital Philippines Corp.*

*10:00 AM - 10:30AM* — **2.3 Analysis of ESC/ ESD Control for Wafer Mount and De-taping Process**
*Ong Wai Kong (Jeremy), Goh Chin Bee (Maurice), UTAC; Yeo Chee Keong (Benson), Dou Yee*

*10:30 AM - 11:00 AM* — Coffee Break - exhibits open

*11:00 AM - 11:30 AM* — **2.4 ESD Assessment on Advantest M4841 Test Equipment**
*Steve Lim, STMicroelectronics*

*11:30 AM - 12:00 PM* — **2.5 ESD Risk Assessment for Automated Handling Equipment**
*Marcus Koh, Everfeed Technology Pte. Ltd.*

*12:00 PM - 1:00 PM* — Lunch Break

*1:00 PM - 1:30 PM* — **2.6 ESD Risk Analysis using Pulsed AC Ionization Technology**
*Joshua Yoo, Ethan Choi, Elly Koo, Core Insight*

*1:30 PM- 2:00 PM* — **2.7 Real Time Monitoring of Air Ionization**
*Arnold Steinman, Electronics Workshop, NRD, LLC*

*2:00 PM - 2:30 PM* — **2.8 Novel Static Charge Reduction Technology Using Simple Tinsel Thread & Humid Air Technique on Web**
*Albert Kow Kek Hing, Alson Kow Chung Hooi, ESD Consultancy*

*2:30 PM - 3:00 PM* — Coffee Break - exhibits open

*3:00 PM - 3:30PM* — **2.9 Impact of Pogo Probes on CDM Testing of Semiconductor Flip Chip Packages**
*Nelson Loh, Jeetanshu Shah AMD*

*3:30 PM - 4:00 PM* — **2.10 FI CDM Effect by Human Body on SSD Testers**
*Ku Fwu Haur, Micron Semiconductor Asia*

# Schedule

## THURSDAY OCTOBER 17, 2019 CONTINUED

*4:00 PM - 4:30 PM*

**2.11 Investigations on Connectors used on Printed Circuit Boards**

*Vesupathy Kannan, Celestica, Inc.*

*4:30 PM - 5:00 PM*

**2.12 High Charge on PCBA Array Board**

*Morse Wong, Sanmina-SCI System Pte. Ltd.*



*2019 EOS/ESD Manufacturing Symposium China*

# EOS/ESD Manufacturing Symposium in Malaysia

**WEDNESDAY OCTOBER 16, 2019**

### 1.1 How Do I Get My Manufacturing Site ANSI/ESD S20.20 Certified

*Bernard Chin, Qorvo; Marcus Koh, Everfeed Technology Pte.Ltd.*

This paper highlights some challenges and factors to consider when proceeding with ANSI/ESD S20.20 site certification. Suggestions on how to build in a more robust quality system beyond ANSI/ESD S20.20 requirements, together with a discussion of where ANSI/ESD S20.20 can be improved on will also be presented.

### 1.2 ANSI/ESD S20.20 Tailoring for ESD Seating

*Intan Fazliana Osman, TienShin Lee, Benchmark Electronics*

The aim of this presentation is to assess the ESD risk of seated operators if they do not wear a wrist strap as part of their personal grounding. This requires a technical report and tailoring statement in ESD Control Plan to assess the ESD seating using resistance measurements, operators' body voltage and appropriate evaluation instruments.

### 1.3 Electronic Parts and Electrostatic Discharge (ESD) - Gaps and Mitigation Stratgeies Updates

*Shri G. Agarwal, NASA - Jet Propulsion Laboratory*

Gaps on ESD standards have evolved because of new technology and inconsistencies of standards development (e.g., three zaps vs. one zap per pin for testing). Mitigation strategies include ESD surveys, observations during audits, standards updates (including harmonization of standards), & outreach to the military & space communities.

### 1.4 ESD Control Misconceptions and Incorrect Applications

*Albert Khoo, GK Yeoh, Charles Ratnam, ESD Consulting*

This presentation highlights some common real life situations focusing on ionization and ESD material usage, with precautions and solutions needed for protecting the integrity of EPAs.

### 1.5 Mitigating EMI-Caused Electrical Overstress (EOS) in Manufacturing

*Vladimir Kraz, OnFILTER*

This paper presents understanding of EMI sources in the manufacturing environment. It discusses how EMI is transmitted to the devices in the process of manufacturing, and how to Block EMI at the source, reduce EMI in transmission, and block EMI at the "target". Practical examples of mitigation of EOS due to EMI on wire bonder soldering will be discussed.

### 1.6 Managing Electrical Overstress (EOS) in Electronic Manufacturing

*Vladimir Kraz, OnFILTER*

EOS management focuses on reduction of excessive voltages and currents that are not caused by static charge. This paper presents EOS management in more detail, such as EOS Measurement, EOS Mitigation, and EOS Survey and Audit.

### 1.7 AHE Grounding Considerations: Low to High Frequency

*Marcus Koh, Everfeed Technology Pte. Ltd.*

This paper describes the decision-making process on the selection of grouding cables. Careful selection of grounding cables is needed to mitigate random degradation of parametric test yield due to stochastic high frequency ground current noise issues.The study presented in this paper affected more than 200 automated tester handlers of a back-end semiconductor factory when testing Radio Frequency Integrated Circuit ESD Sensitive devices.

### 1.8 Smock & Human Body Grounding through Wrist Straps

*Maurice Goh, UMS Singapore; Bernard Chin, Qorvo*

This paper proposes a practical method to ensure all ESD garments satisfy the electric field objective of bonding garment/skin to ground. Quantitative assessments with considerations beyond ANSI/ESD STM97.1 and STM97.2 were made. A proposal addressing dust control violation issues arising from wrist strap worn directly on the skin is provided.

### 1.9 Other Industry Practice – Garment Fabric Evaluation

*Tay, Chin Siang, Suzhou TA&A Ultraclean Technology Co., Ltd.*

Using only the ANSI/ESD STM2.1 ESD garment resistance measurement alone may limit the options for fabric selection and, as such, some users have resorted to developing in-house tribocharging evaluation methods. The end goal is to produce a test setup that is practical, yielding reproducible qualitative results based on given possible end-use scenarios.

### 1.10 Good ESD Control Cleanroom Nitrile Gloves

*Heng King Wey, CE Technology Berhad*

This paper explores the compounding formulation for manufacturing and post-processing of cleanroom nitrile gloves. The aim of this study is to be able to strike a balance between the ESD properties of surface and volume resistances against acceptable water extractable ion levels to meet specific end-user requirements.

### 1.11 Polyurethane and Epoxy Based Floor Coatings and Sealings Meet the Latest ESD-Standards

*Gerhard Kraus, StoCretec GmbH Kriftel, Germany*

Epoxy floors containing so called Ionic Liquids are an economic alternative to rather expensive ESD-floors using conductive fillers, but one has to be aware of the limits of such floors.

# EOS/ESD Manufacturing Symposium in Malaysia

**THURSDAY OCTOBER 17, 2019**

## 2.1 EOS/ESD in IC Manufacturing Process of GQFN 64L Device

*Bernard Chin, Qorvo; Marcus Koh, Everfeed Technology Pte. Ltd.*

This paper presents a case study of ESD/EOS events causing low yield in trial lots prior to the release of volume production. Line ESD audits were used to check for static charge, grounding and CDM events. Voltage spike check and split-lot testing were used to determine the root cause.

## 2.2 Automated Real-time System for Prediction and Detection of ESD Parametric Failures in Non-tested Parts

*Ray Nicanor Tag-At, Ma. Venus M. Gambito, Merryl Mabias, Western Digital Philippines Corp.*

High ESD DPPM was observed at the incoming slider electrical test at the customer due to ESD failure at the Tape Bond Process. This paper presents a concept to use the test data from RBQST and SDET to analyze potential ESD failures through the change in the MR resistance. If potential ESD failure is detected, the affected lots will be routed to DET for 100% testing.

## 2.3 Analysis of ESC/ ESD Control for Wafer Mount and De-taping Process

*Ong Wai Kong (Jeremy), Goh Chin Bee (Maurice), UTAC; Yeo Chee Keong (Benson), Dou Yee*

This presentation introduces an ESD event detector, which sets up a baseline reference with respect to time for: a) process without ESD sensitive devices (ESDS), and b) process with ESDS for different scenarios, in a wafer mount and de-tape process. The author attempts to understand the process and charge mitigation.

## 2.4 ESD Assessment on Advantest M4841 Test Equipment

*Steve Lim, STMicroelectronics*

ESD assessment using resistance and voltage measurements was conducted for a high speed automated handling equipment (AHE) to ascertain whether the AHE met the organisation's ESD specifications. The criteria for pass or fail is the focus of this presentation.

## 2.5 ESD Risk Assessment for Automated Handling Equipment

*Marcus Koh, Everfeed Technology Pte. Ltd.*

ANSI/ESD SP10.1 acts as an ESD risk assessment guideline for test personnel to audit Automated Handling Equipment. Two units each of die attached and wire bonder machine were audited. Additional ESD risk assessment considerations, on top of ANSI/ESD SP10.1, were proposed and discussed.

## 2.6 ESD Risk Analysis using Pulsed AC Ionization Technology

*Joshua Yoo, Ethan Choi, Elly Koo, Core Insight*

Ionization has a major role in Flat Panel Display (FPD) assembly. While ANSI/ESD STM 3.1 is the test method for evaluation of ionization, there are some limitations that could affect yields. This presentation will discuss the limitations and risks associated with ionization.

## 2.7 Real Time Monitoring of Air Ionization

*Arnold Steinman, Electronics Workshop, NRD, LLC*

Air Ionization can be monitored in real time and continuously (24/7). Utilizing Big Data from Air Ionizers can help to predict performance,prevent possible product quality deviations, assist in failure mode/ root cause analysis and can implement an automated statistical process control.

## 2.8 Novel Static Charge Reduction Technology Using Simple Tinsel Thread & Humid Air Technique on Web

*Albert Kow Kek Hing, Alson Kow Chung Hooi, ESD Consultancy*

This paper discloses a static charge reduction technique on moving web using mist-free humid air with a blade-like tinsel. With the web's surface just touching the blade-like tinsel under an airflow of 85% - 90% RH or above, the moving web voltage was found to drop to below 5% - 10% of its original value permanently.

## 2.9 Impact of Pogo Probes on CDM Testing of Semiconductor Flip Chip Packages

*Nelson Loh, Jeetanshu Shah AMD*

CDM events contribute to a majority of ESD failures, and the type of discharging tip greatly affects the magnitude of the peak current. This study analyses the variation of current with respect to the tip of the pogo pin and recommends the best fit pogo pin for different packages based on the type of their tip.

## 2.10 FI CDM Effect by Human Body on SSD Testers

*Ku Fwu Haur, Micron Semiconductor Asia*

This paper illustrates how an electronic product under test can induce damage to the test instrument. The traditional assumption is that ESDS devices become safer when the capacitance of the product increases. However, the risks this poses to ESD-sensitive testers should also considered.

## 2.11 Investigations on Connectors used on Printed Circuit Boards

*Vesupathy Kannan, Celestica, Inc.*

We investigate how the induced voltage on the pins of Press Fit and CMT connectors could lead to ESD related risks. In-depth measurements on connectors and its packaging provide voltage levels which could be then be used to determine the ESD related risk on hi-speed ESDS devices. Effective mitigation actions could then be developed to address these risks.

## 2.12 High Charge on PCBA Array Board

*Morse Wong, Sanmina-SCI System Pte. Ltd.*

This presentation narrates the application of ANSI/ESD S20.20 best practices to printed circuit board assembly (PCBA), for the measurement of resistance and voltage. Appropriate mitigation techniques are proposed to mitigate ESD risks.

# EOS/ESD Manufacturing Symposium in Malaysia

## Penang Skills Development Centre
## October 14th-17th 2019
## October 18th Program Manager Exam (optional)

## EOS/ESD Association, Inc. brings ESD Program Manager Certification to Asia!

Professional Program Manager Certification ensures the understanding of the standard practices and problem solving techniques used to create an ESD protection program in the workplace.

**https://www.esda.org/certification/eosesd-association-professional-program-manager/**

**Attend** 3 face to face courses

1. ESD Basics for the Program Manager
2. How To's of In-Plant ESD Auditing and Evaluation Measurements
3. ESD Program Development & Assessment (ANSI/ESD S20.20)

**Courses are offered at annual EOS/ESD Association events in Asia**

**Attend** 7 online courses

1. Cleanroom Considerations for the Program Manager
2. Ionization Issues and Answers for the Program Manager
3. System Level for the Program Manager
4. Packaging Principles for the Program Manager
5. ESD Association Standards Overview
6. Device Technology and Failure Analysis for the Program Manager
7. Electrostatic Calculations for the Program Manager

**Attend online- anytime!**

**Pass** ESD Professional Program Manager exam

***Offered for the 1st time in Malaysia!***
***October 14th~18th, 2019***
***www.esda.org***

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| Day 1 | Day 2 | Day 3 | | | Day 4 | | | Day 5 |
|---|---|---|---|---|---|---|---|---|
| ESD Basics | How to's in plant audit & measurement | S20.20 Day 1 | Technical Presentation & Talk | Exhibition | S20.20 Day 2 | Technical Presentation & Talk | Exhibition | PrM Exam |
| | 5:30-7pm Calculation Review | | | | 5:30-7pm PrM Review | | | |

# EOS/ESD Manufacturing Symposium in Malaysia

## Penang Skills Development Centre
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## October 18th Program Manager Exam (optional)

## FC100: ESD Basics for the Program Manager

**OCTOBER 14, 2019 9:00 AM - 5:00 PM**

*Ron Gibson, Advanced Static Control Consulting*

Certification: PrM

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

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

**OCTOBER 15, 2019 9:00 AM - 5:00 PM**

*Ron Gibson, Advanced Static Control Consulting*

Certification: PrM

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

# EOS/ESD Manufacturing Symposium in Malaysia

## Penang Skills Development Centre
## October 14th-17th 2019
## October 18th Program Manager Exam (optional)

### FC340: ESD Program Development and Assessment (ANSI/ESD S20.20)

**OCTOBER 16-17, 2019 9:00 AM - 5:00 PM**

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

Certification: PrM

This seminar provides instruction on designing and implementing an ESD control program based on ANSI/ESD S20.20. The course provides participants with the tools and techniques to prepare for an ESD facility audit. This two-day course is an ESDA certification requirement for in-plant auditors and program managers who are working toward professional ESD certification.

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

**It is recommended that the ESD Program Development and Assessment (ANSI S20.20) be taken after the certification candidate has taken most of the other program manager related tutorials.**

**OCTOBER 18**

Optional Program Manager Exam


# EOS/ESD Manufacturing Symposium in Malaysia

## Penang Skills Development Centre
## October 14th-17th 2019
## October 18th Program Manager Exam (optional)

### About the Instructors:

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. ASCC has been endorsed by the ESD Association as a third party service provider for the training and certification of individuals to TR53. 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 EOS/ESD Association, Inc. (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 was the first chairman of the ESDA certification business unit. Currently, Gibson is the chair of the Facility Certification committee that is responsible for certifying facilities to ANSI/ESD S20.20. Gibson is an ESDA certified instructor for the program manager certification program, and is a certified Chief ESD coordinator for the Reliability Center of Japan.

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 EOS/ESD Association, Inc., 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 EOS/ESD Association, Inc. 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 EOS/ESD Association, Inc., John was presented with the outstanding contribution award in September 2006.

# EOS/ESD Manufacturing Symposium in Malaysia

## Penang Skills Development Centre
## October 14th-17th 2019
## October 18th Program Manager Exam (optional)

First Name: _____ Last Name: _____

Company Name: _____

Street: _____ City: _____

State/Province: _____ Country _____ Zip/Postal Code:_____

Address is (please circle the one that applies) Home or Company

Phone: _____ E-mail: _____

### Tutorial Selection

☐ **Day 1 ESD Basics for the Program Manager*** — **$510 USD/ non-member $610 USD**

☐ **Day 2 How To's of In-Plant ESD Auditing and Evaluation Measurements*** — **$510 USD/ non-member $610 USD**

☐ **Day 3 & 4 ESD Program Development & Assessment (ANSI/ESD S20.20)*** — **$1,510 USD/ non-member $1,610USD**

☐ **Day 5 Professional Program Manager Certification Exam (Optional October 18, 2019)** — **$80 USD**

NOTE: You must initiate an official file in your name at EOS/ESD Association, Inc., pay the $50 USD filing fee, and complete all pre-requisite courses to be eligable to take the exam.

### Symposium

☐ **Day 3 & 4 Symposium: Technical Presentation, Talk, and Exhibits*** — **$800 USD**

The EOS/ESD Association, Inc. offers a fifty percent discount for full-time students. Proof of enrollment required. Student fees apply only to symposium or tutorial registration and do not apply to exclusive 10 course bundle for Malaysia event.

* Day 1, 2, 3, & 4, Eligible for HRDF claims under the Kim Bantuan Latihan (SBL) Scheme, subject to prior application to HRDF by the employers/companies.

### Exclusive 10 course bundle for Malaysia event
### Certified Program Manger Certification*

**For the exclusive bundle price, payment MUST be made before September 15th, 2019.**

☐ **3 face to face courses: ESD Basics, How To's and S20.20 (Days 1-4)** — **$5,000 USD**

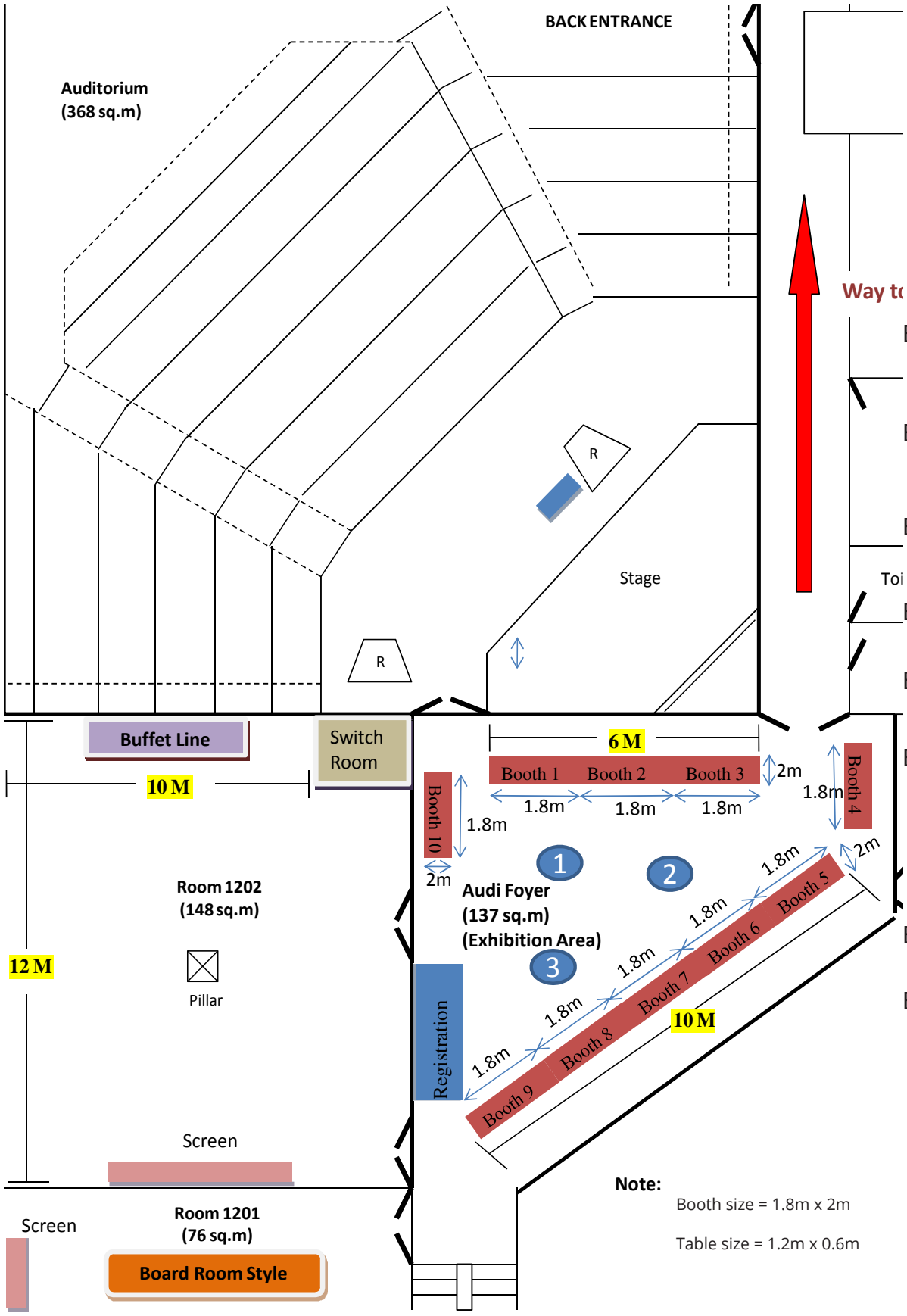
**7 Online courses: (Class links provided upon payment)**

- Cleanroom Considerations for the Program Manager
- Ionization Issues and Answers for the Program Manager
- System Level for the Program Manager
- Packaging Principles for the Program Manager
- ESD Association Standards Overview
- Device Technology and FA Overview
- Electrostatic Calculations for the Program Manager


## Register Online at: http://www.cvent.com/d/m6qjyt

**Alternative payment: contact Everfeed Phone: +65 6863 1488 E-Mail: info@everfeed.com.sg**

# EOS/ESD Manufacturing Symposium in Malaysia




| | |
|---|---|
| Booth 9 | Bold-Pack Industries Sdn. Bhd. |
| Booth 4 | Cesstech (S) Pte. Ltd. |
| Booth 3 | Dou Yee Enterprises (S) Pte. Ltd. |
| Booth 10 | Innospectra (Aisa) Pte. Ltd. |
| Booth 2 | Lubrizol Southeast Asia (Pte) Ltd. |
| Booth 8 | NRD Asia Pte. Ltd. |
| Booth 6 | SMC Automation (malaysia) Sdn. Bhd. |
| Booth 5 | Sto SEA Sdn Bhd |
| Booth 1 | Tako Astatic Technology Sdn Bhd |

**Note:**

Booth size = 1.8m x 2m

Table size = 1.2m x 0.6m

# EOS/ESD Manufacturing Symposium in Malaysia

# Exhibitor Registration Only

**APPLICATION FOR EXHIBIT SPACE**

Name of Company:_____

Street Address:_____

City, State, Postal Code:_____

Country:_____

Telephone:_____

Contact:_____Email:_____

Please provide web address to be used for your link on ESDA website: _____

We will exhibit and demonstrate the following products or services:_____

_____

We are_____Manufacturers_____Other (please specify)_____

**Exhibit Space Rental: $1,000.00 USD**
**FULL PAYMENT DUE WITH REGISTRATION**

**Requested Booth Space_____Second choice_____Third Choice_____**

Amount enclosed $_____ ☐ Check ☐ Visa® ☐ MasterCard® ☐ American Express® ☐ Discover®

Credit card number:_____ Expiration date: _____

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City:_____ State:_____Zip/Postal Code:_____

THE UNDERSIGNED HAS READ AND AGREES TO ABIDE BY THE TERMS ON BOTH SIDES OF THIS APPLICATION.

Application By:_____ Date: _____
(Signature)

NOTES:

1. Each exhibitor receives one (1) symposium registration package for each booth rented.
2. SPACE WILL BE ASSIGNED IN THE ORDER OF RECEIPT OF REGISTRATION
3. Management reserves the right to relocate exhibit space, as necessary, to conform to show regulations.