

59th Annual Technical Meeting of the Institute of Environmental Sciences and Technology

(ESTECH 2013)

Connect, Learn, Grow, Recharge

Technical Presentations

**San Diego, California, USA
30 April – 2 May 2013**

ISBN: 978-1-62748-969-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by IEST
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact IEST
at the address below.

IEST
Arlington Place One
2340 South Arlington Heights Road, Suite 100
Arlington Heights, IL 60005-4516

Phone: (847) 981-0100
Fax: (847) 981-4130

iest@iest.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

AMC AND SMC

Wipe Testing of Critical Surfaces to Determine Surface Metallic Contamination in Cleanrooms	1
<i>A. Dato, J. Jew, W. York, M. Coste, L. Huerta, B. Norton, V. Chia, F. Li, S. Anderson</i>	
Corona Air Ionizer Tip Residue Analysis II. SEM-EDS & ICP-MS for *Refractory AMC Detection & Reduced Ionizer Maintenance, Particulation, and Lowered Risk to UV Optics	12
<i>H. Gotts, M. Camenzind, J. Jew, L. Levit, W. York</i>	

CLEANROOM DESIGN

Clean Room Designs: Basics of Sterile Compounding Pharmacy Facilities	29
<i>Rick Meyer</i>	
Optimizing Cleanrooms for Product and Personnel Access.....	37
<i>Rob Miller</i>	
Design & Energy Evaluation of Horizontal Cleanrooms.....	44
<i>Vincent Sakraida</i>	
Minimizing Particle Migration By Room Pressure Control and Airlock Utilization.....	56
<i>Wei Sun</i>	

CLEANROOM HOUSEKEEPING

ISO 14644-5: From the Ground Up, Basic Requirements for Cleanroom Operations Involving Cleanroom Matting	68
<i>Dennis Baldwin</i>	
Selecting Suitable Cleanroom Materials for USP <797> Housekeeping	78
<i>Michelle Bock</i>	

CLEANROOM TESTING AND MONITORING

Particle Counting and Housekeeping.....	94
<i>Peter Maguire</i>	
Cleanroom Classification with Safety Margin Factor for Small Number of Sample Locations and Other Issues.....	111
<i>Alexander Fedotov, Grigory Fedotov</i>	
Keeping Your Testing SOP's Current	135
<i>Don Hill</i>	
Testing Requirements for USP 797	151
<i>Patrick Law</i>	
Cleanroom Innovations	165
<i>Dan Milholland</i>	

ENVIRONMENTAL CONSIDERATIONS

Considering Sustainability for Cleanroom Design, Cleaning and Material Selection	179
<i>David Harry</i>	
HEPA-volution.....	188
<i>Odette Nolan</i>	
Advances in Inorganic Testing	196
<i>Frank Weber</i>	

FILTRATION EFFECTS

Nanofiber Selection: Designing Filtration Media for High Efficiency Air Filtration Applications	211
<i>Geoff Crosby</i>	

Testing HEPA Filters	224
<i>Dan Milholland</i>	
Properties and Characteristics of Scrim Supported ePTFE Membrane HEPA Filters.....	235
<i>Michael Osborne</i>	

PARTICLE COUNTING ADVANCES

Advances in Particle Counting: Nanoparticle Detection.....	243
<i>Steven Kochevar</i>	
Particle Counter vs Photometer	260
<i>Peter Maguire</i>	

PHARMACEUTICAL

Sanitizer Efficacy Studies.....	273
<i>Gordon Ely</i>	
Solutions for Addressing Fungal and Bacterial Contamination in Cleanrooms.....	288
<i>Jim Polarine Jr.</i>	
Cleanroom Cleaning & Disinfection Program: Residues and Rinsing.....	324
<i>Marc Rogers</i>	
Verification of the Effect of “Push-Pull” Airflow to Reduce the Concentration of Airborne Microbe Generated by Cough.....	342
<i>Miki Shinya, Kazuki Itakura, Andy Watanabe</i>	

ACOUSTICS TESTING

Random Vibration Environments in Launch Vehicles.....	356
<i>Jack Arends, Albert Lee</i>	
Double Side Acoustic Correction Factors	363
<i>Albert Lee, Jack Arends</i>	
Microphone or Pressure Sensor	370
<i>Jon Wilson</i>	

AUTOMOTIVE MILITARY VEHICLE TESTING

Mitigating Risk of Battery Testing in Environmental Chambers.....	379
<i>Mark Chrusciel</i>	
ISO 16750-3: Past, Present and Future.....	397
<i>Christian Dindorf</i>	
Taking Data from the Field to the Laboratory.....	405
<i>N/A</i>	
Enhancing & Predicting Reliability of Automotive Electronics Using Physics of Failure Modeling.....	413
<i>Cheryl Tulkoff</i>	

DATA REDUCTION

Rapid Design Cycles and Explosive Data Growth in Engineering Test	441
<i>Robert Eaton</i>	
Traditional and Accelerated Reliability Growth: The Case of Lost (and Found) Failure Rates	455
<i>Milena Krasich</i>	
Application of ATML Test Results and IntraStage to Facilitate Intelligent Data Analysis	464
<i>Harsh Wanigaratne</i>	

ENVIRONMENTAL TESTING CHALLENGES

Creation of an “RF Invisible“ Test Chamber for Ultra-Low Thermal & PIM Testing.....	477
<i>Christopher Foster</i>	
How to Know if Your Parts are Counterfeit.....	497
<i>Chris Peterson</i>	

HALT AND HASS

Introduction to Piezoelectric Sensors for HALT and HASS Testing	504
<i>Dave Change</i>	
Accelerated Life Test (Not HALT but ALT)	522
<i>Dave Kinghorn</i>	
Anatomy of a HALT Test	547
<i>Harry Schwab</i>	

MULTISHAKER MIMO TESTING

Advanced High-Frequency 6-DOF Vibration Testing Using the Tensor 18kN System	587
<i>Joel Hoksbergen</i>	
Simultaneous Control of Dual 6 DOF Tables	612
<i>Thomas Reilly</i>	
Minimum Output Trace for Multiple Input Multiple Output Linear Systems	625
<i>David Smallwood</i>	
Multiaxis for More Realistic Vibration Testing	644
<i>Wayne Tustin</i>	

SENSORS IN CLIMATIC TESTING

Shielded Temperature Measurement Fundamentals	668
<i>George Coonley</i>	
Environmental Test Chamber Sensor Applications – What You Should Know	683
<i>Aaron Robinson</i>	

SENSORS IN DYNAMICS TESTING

Characterization of Damped Accelerometers with Full Range Hopkinson Bar Shock	694
<i>Vesta Bateman, James Letterneau</i>	
Dynamic Testing with Laser Doppler Vibrometry	708
<i>David Oliver</i>	
Theories and Applications of Sensors in Dynamics Testing: Experimental Evaluation of Helical Electromagnetic Launchers	716
<i>Erik Timson</i>	
Avoid Sensor Shock	733
<i>Jon Wilson</i>	

SHOCK TESTING

ISO 16063-22 AMENDMENT	740
<i>Vesta Bateman, David Evans</i>	
Energy Methods an Alternative to the SRS	753
<i>David Smallwood</i>	
Shock Indicating Labels: Worth It or Waste?	787
<i>Dave Vess</i>	

SHOCK VIBRATION FIXTURE DESIGN

How to Properly Design a Large Head Expander	800
<i>Michael (Tienen) Chao</i>	

OPERATIONS

Software Solutions for Fabrication Facilities	812
<i>Mike Badger</i>	
Implementing Multidisciplinary Research Center Infrastructure	828
<i>Burak Birkan</i>	
CLEAN: A Holistic (and Agile) Approach to LIMS	842
<i>Vincenzo Di Bernardo</i>	

Building The Perfect Beast (Building a Publicly Funded University Clean Room)	854
<i>Thomas Ferraguto</i>	
Towards a Supermassive Research Center: Scaling Rules for Laboratory Operations	864
<i>Eric Martin</i>	
Improved Safety, Productivity and Quality in Semiconductor Manufacture with On-site Hydrogen Production.....	877
<i>Hal Scott, Carolyn Chapman</i>	
Components of an Effective Emergency Response Team in a Urban University Setting	886
<i>John Sweeney</i>	
Laboratory Staff Evaluation Process	897
<i>John Weaver</i>	
Author Index	