

# CMSE 2017

## Program Book



### 21<sup>st</sup> Annual

Components for Military & Space Electronics  
Conference & Exhibition

April 11-13<sup>th</sup>, 2017

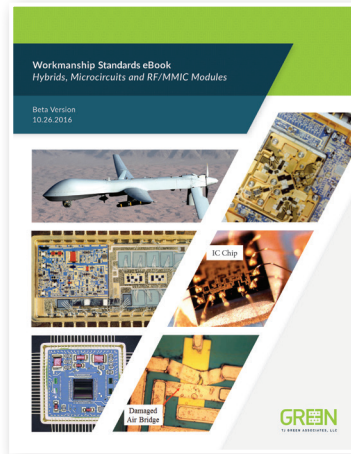
Four Points by Sheraton (LAX)  
Los Angeles, California



Organized by: TJ Green Associates LLC

## Workmanship Standards eBook: Hybrids, Microcircuits and RF/MMIC Modules

This is an online illustrated guide depicting photos of common workmanship defects as seen during production and each defect slide is tied to a particular page in MIL-STD-883. Its intended as an on-the-floor working document for operators, inspectors and quality engineers to facilitate an understanding of defects generated during the manufacture of hybrids, microcircuits and RF/MMIC modules and how they relate to the contractual requirements of MIL-STD-883.



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linked to  
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requirements with  
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CMSEWORK20

## Welcome to CMSE 2017

Dear Military and Space Electronics Professionals,

On behalf of the Program Committee I would like to personally welcome everyone to this year's 21st annual CMSE Conference and Exhibition. This is an interactive event that requires full participation from the attendees as well as the speakers and exhibitors. The idea is to promote broad discussion about grass root technical issues we all face together in this industry. So please take the time to listen, ask good questions and don't hesitate to respectfully challenge each other's ideas and technical opinions.

I'd like to personally thank our sponsors and exhibitors for supporting CMSE. On a programming note an electronic copy of all the presentations will be sent via a secure link to all attendees after completion of CMSE 2017.

I look forward to speaking to each and everyone, welcome!

*Tom Green*

Program Chairman

## Program Committee

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TJ Green Associates LLC  
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Raytheon

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Mike McKeown  
Hesse Mechatronics

Mike Sampson  
NASA

Jeff Sokol  
The Aerospace Corp.

Tom Terlizzi  
TJ Green Associates LLC





# Keynote Speakers

**Michael J. Sampson** received his MSc in Engineering Management from the University of Maryland, University College, in 1999. He has been co-Manager of the NASA Electronic Parts and Packaging (NEPP) Program since October 1, 2003 and GSFC Alert Coordinator since 2005. The NEPP program is a cross- agency activity that evaluates new and emerging EEE part technologies, shares information and develops tools for EEE parts assurance. Mike has worked for NASA for over 20 years. Before joining NASA, Mike spent five years as a NASA support contractor and before that, more than twenty years as an engineer and engineering manager in electronic parts manufacturing.

**David Davis** is currently the SMC Chief Systems Engineer at the Space and Missile Systems Center, Air Force Space Command, Los Angeles Air Force Base, CA. He has also served as the Acting Engineering Director. Mr Davis is in his 39th year at SMC where he spent the first ten years supporting the Global Positioning System (GPS) Program and Defense Meteorological Satellite Program (DMSP) working primarily satellite hardware design, manufacturing, quality and test. In his role, he supports the Commander and the Director of Engineering for center wide application of systems engineering, parts, materials and processes, radiation hardening, specifications and standards, industrial base, manufacturing/quality engineering, and space flight worthiness assessment.

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COMPONENT TEST AND ANALYSIS LABORATORIES

The Raytheon Component Test and Analysis Lab is a full-service facility for evaluating, testing, and performing root cause failure analysis on components for commercial, airborne, military, space and other applications. Analysis team specializes in working with electronic and mechanical components such as hybrids, connectors, cables, harnesses, passive or discrete components, and digital or linear devices. With access to a detailed database containing more than 30 years of test and analysis data, our team is able to contribute a wealth of experience and insight when assessing new customer requirements.



**ENVIRONMENTL TESTING**

- Burn-in
- Temperature cycling
- Humidity
- Constant acceleration
- Data acquisition
- Highly accelerated stress test (HAST)
- Thermal shock

**ELECTRICAL TESTING**

- Digital, linear, ASICs
- Wafer probing
- Semiconductors
- RF and microwave
- Passive and magnetics
- Opto-electronics

**RADIATION TESTING**

- Total dose gamma
- Neutron
- Dose rate
- Single event environments

**CERTIFICATION**

- NAS 410 Level II in radiographic testing (RT), ultrasonic testing(UT), penetrant testing (PT)
- AS9100
- OSHA VPP
- DSCC lab per MIL-STD-750, MIL-PRF-19500



**IMAGING/MICROSCOPY CAPABILITIES**

- Radiography (real-time and computed tomography (CT))
- Focused ion beam (FIB) microscopy
- Scanning electron microscopy (SEM)
- Infrared thermography (hot spot detection)
- Infrared thermal mapping
- Photoemission microscopy
- Energy dispersive x-ray analysis
- C-mode scanning acoustic microscopy (C-SAM)

**DESTRUCTIVE TESTING**

- Cross-sectional and metallographic analysis
- Precision milling/sample preparation
- Chemical decapsulation/depotting
- Mechanical delidding
- Particle retrieval and analysis
- Dye penetrant examination
- Dimensional measurements
- Photomicrography
- Die/ball/bump shear, bond pull

**SPECIAL CAPABILITIES**

- Counterfeit components identification
- PWB coupon evaluation
- Prohibited materials testing (in-house or off-site)
- Materials analysis
- Construction analysis
- Fractography
- Semiconductor (die-level) microprobing
- Particle impact noise detection (PIND)
- Hermetic seal testing (fine and gross)
- Lot evaluation (LAT, freshness, screening)
- Microhardness testing (Vickers, Knoop)
- Hardness testing (Rockwell)
- Solderability testing



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TUESDAY	TRAINING SEMINARS		
	0700 - 0800	BREAKFAST AND REGISTRATION	
	0800 - 1200	Session A <b>Hermeticity Testing, RGA and the New TM 1014 Spec Limits</b>	<a href="#">Thomas J Green</a> TJ Green Associates LLC <a href="#">Robert Lowry</a> Electronic Materials Consultant
		Session B <b>Multi Layer Ceramic Capacitor Technology...Materials, Processes and Reliability</b>	<a href="#">John Marshall</a> AVX Corp
	1300 - 1700	Session A <b>Non-Hermetic Packaging for Hi-Rel Military and Aerospace</b>	<a href="#">Thomas J Green</a> TJ Green Associates LLC <a href="#">Robert Lowry</a> Electronic Materials Consultant
		Session B <b>Microelectronic Package &amp; Board Failure Mechanisms and Related Analysis Techniques</b>	<a href="#">Steve Greathouse</a> Plexus Corporation



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WEDNESDAY	EXHIBITOR HOURS: 1100 - 1900		
	0800 - 0815	Welcome/Intro	
	0815 - 0845	<b>Keynote</b> Echoes Of The Past, Glimpses Of The Future... Ongoing Trends In Assurance Of EEE Parts For Spaceflight	<b>Michael J. Sampson</b> NASA Goddard Space Flight Center
	Session 1 - Hermetic Vs Non-Hermetic Packaging.....Is Our Fate Sealed?		
	0845 - 0910	1.1 Hermetic and Non-Hermetic QML ICs – Current Status and Challenges	<b>Shri Agarawl</b> NASA JPL
	0910 - 0935	1.2 COTS & COTS + Tantalum Capacitor Failures Confirm Systemic Moisture Sensitivity Issues	<b>Aaron Dermarderosian</b> Raytheon Space And Airborne Systems
	0935 - 1000	1.3 The New Tighter Hermeticity Test Leak Requirements – European Overview	<b>Gonzalo Fernández Romero</b> Alter Technology
	1000 - 1015	COFFEE BREAK	
	1015 - 1040	1.4 Hermetic Weld Schedule Optimization Based Tighter TM 1014 Leak Rate Specifications	<b>Rich Richardson</b> Microcircuit Labs LLC
	1040 - 1105	1.5 Meeting the New Tighter Hermeticity Requirements with Optical Leak Testing (OLT)	<b>Tom Trafford</b> NORCOM
	1105 - 1130	1.6 Gross Leak Standards Development	<b>Kathy Laird</b> NASA/MSFC
	1130 - 1200	1.7 Hermetic/Non-Hermetic Panel Discussion	<b>Tom Green, Moderator</b> TJ Green Associates LLC
	1200 - 1400	LUNCH - IN EXHIBITS AREA	
	Session 2 - Passive Components and Packaging Methods for Hi Rel/Space Applications		
	1400 - 1425	2.1 Degradation and ESR Failures in MnO2 Chip Tantalum Capacitors	<b>Alexander Teverovsky</b> ASRC Federal Space and Defense
	1425 - 1450	2.2 Tantalum Polymer Capacitors: COTS plus Solutions for Space Applications	<b>Chris Reynolds</b> AVX
	1450 - 1515	2.3 Polymer Tantalum Capacitors Under Vacuum	<b>Michael Cozzolino</b> Raytheon Systems
	1515 - 1540	2.4 Advanced Polymer Capacitors	<b>Chuck Pothier</b> Vishay
	1540 - 1600	COFFEE BREAK	
	1600 - 1625	2.5 Hermetic Tantalum Caps for High Power Pulse Applications	<b>Charlie Dewey</b> Evans Capacitor Company
1625 - 1650	2.6 Base Metal Ceramic Capacitors for High Reliability Applications	<b>John Marshall</b> AVX	
1650 - 1715	2.7 A Low Profile High Power Inductor for High Reliability Applications	<b>David Olson</b> Vishay	
1715 - 1740	2.8 Polymer Tantalum Capacitors for Use in Mission Critical Applications	<b>Ed Jones</b> KEMET Electronics Corporation	
1745 - 2000	WELCOME RECEPTION BUFFET		

EXHIBITOR HOURS: 1000 - 1400				
0800 - 0830	Keynote Challenges for Future Space Systems Acquisitions		Dave Davis USAF SMC	
Session 3 - Copper Wire Bonding for High Reliability Applications				
0830 - 0855	3.1 Introduction of High Reliability Copper Bonding Wire for High Rel Industrial, A&D Automotive Applications		William (Bud) Crockett, Jr. Tanaka Denshi Group Saga	
0855 - 0920	3.2 A Review on Copper Wirebond Technology in PEMs		Dr. Mukul Saran, QRE Texas Instruments	
0920 - 0945	3.3 Assessment of Copper Bond Wire for Use in Long Term Military Applications		Aaron Lecomte Raytheon Integrated Defense Systems	
0945 - 1010	3.4 Decapsulation of Copper Wire Bonded Devices		Subramani Manoharan CALCE	Patrick Cluskey University of Maryland
1010 - 1030	COFFEE BREAK			
1030 - 1055	3.5 CU Bond Wire Reliability & Decapsulation Process		S. Ali Lilani Integra Technologies LLC	Gary Downing Analytical Solutions
1050 - 1115	3.6 Flexible Copper Welded Interconnects for Crosstalk Reduction in WBG Power Modules		Dr. Doug Hopkins and Adam Morgan NC State	Mike McKeown Hesse-Mechatronics
1115 - 1140	3.7 High Performance Packaging for Space		Arne K. Knudsen Kyocera America Inc.	
1140 - 1205	3.8 High Reliability Rad Hard e-Mode Gallium Nitride HEMT GaN Power Technologies & Packaging for Space		Jim Larrauri Freebird Semiconductor	
1205 - 1330	LUNCH - IN EXHIBITS AREA			
Session 4 - COTS: SUCCESS STORIES AND CHALLENGES				
1330 - 1355	4.1 Understanding PCB Design & Material Warpage Challenges which Occur during B2B Board-to-Board/Module-Carrier Attachment		Eric Moen Akrometrix	
1355 - 1420	4.2 3D Digital Stitching in the Electronics World and Its Use with Dendritic Growth Studies		Steve Greathouse Plexus Corporation	
1420 - 1445	4.3 HALT Testing for Use of COTS Parts on NASA Missions		Anupam Choubey NASA JPL	
1445 - 1510	4.4 Deployed Forensic Cloud-Based Track and Trace Platform for Microcircuits		Bob MacDowell Applied DNA Sciences	
1510 - 1530	BREAK			
Session 5 - OBSOLETE COMPONENTS and COUNTERFEIT PARTS				
1530 - 1555	5.1 A Counterfeit Component Case History		Bob Lowry Electronic Materials Consultant	
1555 - 1620	5.2 Integrated Circuit Redesign Obsolescence: Assembly Options and Solutions		Tim Flaherty Golden Altos	
1620 - 1645	5.3 Implications of COTS Packaging Modifications in Legacy Systems		Aaron DerMarderosian Raytheon Space and Airborne Systems	
1645 - 1710	5.4 Risks with Obsolete Military Marked Components from the Open Market		Leon Hamiter Components Technology Institute Inc	



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Job Description

Job Title: Senior Component/EEE Parts Engineer (660263)  
Job ID: 660263      Location: CO - Boulder  
Full/Part Time: Full-Time      Regular/Temporary: Regular

Lead and work with Parts, Radiation and Reliability engineers to support design teams in the selection, evaluation, analysis and documentation of Electrical, Electronic, and Electromechanical (EEE) parts.

What you'll do:

- Perform Parts, Radiation and Reliability Engineering functions on complex programs using proven industry techniques and principles:
  - o Evaluate EEE parts against aerospace program screening, and qualification, and component level radiation SEE and TID requirements.
  - o Leverage and maximize company standard parts library usage across programs & product class.
  - o Process Non-Standard Part Approval Requests.
  - o Assist Design Engineering with part and vendor selections.
  - o Work with a Parts Control Board to approve EEE parts;
  - o Maintain and update Program Approved Parts Lists to meet requirements and maximize company standard parts library usage.
  - o Generate part drawings for non-standard parts only.
  - o Review new GIDEP Advisories and Alerts for program impact.
  - o Write and present reports documenting analysis results and anomaly results.
- Lead the Parts/Radiation/Reliability Engineering effort on aerospace programs:
  - o Interface with program personnel such as designers, customers, suppliers, management, and mission assurance disciplines to provide low cost solution.
  - o Translate customer requirements into internal procedures through the construction of a plan, based on BPL (Ball Process Libraries) and ISO processes.
  - o Plan, direct, and review efforts of other component engineers to support the program requirements while working to cost and schedule constraints.

What you'll need:

- BS in Electrical Engineering or a related technical field is required, plus 8 or more years of related experience.
- 8 or more years of continuous, related, progressive experience in the parts/radiation/ reliability engineering discipline is desired. Strong expertise in one or more domains and reasonable knowledge regarding other domains will also be considered.
- Collaborative working skills with programs, cross disciplinary teams and with management.
- Should have or must be able to obtain a TS/SCI clearance.



# 2017 Exhibitors

AEM, Inc.  
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AVX Corporation  
Eastern Applied Research  
Evans Capacitor Company  
Freebird Semiconductor  
Frequency Management Int.  
FRT America  
Golden Altos Corp  
Hesse Mechatronics, Inc  
Microcircuit Laboratories LLC  
Micropac SRL  
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