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Mini-tutorial 1:10 Robert Vermillion, CPP, Fellow, RMV Technology Group, NASA Ames Research Center

CubeSats Require ESD Handling Protocols for Launch & Space Survivability

Bob Vermillion, CPP, Fellow
Certified, ESD & Product Safety Engineer-iNARTE
SME Electrostatics for Aerospace & Defense
A NASA Industry Partner
RMV Technology Group, LLC
NASA-Ames Research Center
Moffett Field, CA 94035
bob@esdrmv.com

CubeSats are relatively inexpensive when compared to traditional vehicle size satellites. However, CubeSat spacecraft functionality in surviving a launch to be operational in space can be questionable. In 2014, it was reported that CubeSat launch costs constituted \$40,000 for a payload and upwards to \$100,000. Consequently, it is Mission Critical that CubeSats do not suffer from ESD damage prior to and during launch.



Tu-Pod in Space¹

According to Mark Betancourt, Air & Space Smithsonian, January 2016, "...One out of every three CubeSats that reach orbit fails to accomplish its mission (one in four is lost in a launch

¹ Photo Courtesy of Amin Djamshidpour, Co-Founder Teton Aerospace

failure)...” Some CubeSat manufacturers have reported up to 50% operational loss in space. During build, are ANSI/ESD S20.20-2014 ESD Protocols being observed to insure best value for the taxpayer?

Do you realize that ESD events can occur during a Launch? Practicing sound electrostatic discharge (ESD) control can support CubeSat survivability in the assembly process by utilization of ANSI/ESD S20.20 ESD procedures.

One cannot overlook Static Control protocols. In review of CubeSat design specifications incorporating ESD sensitive devices, several appear to neither practice nor implement static control procedures.

Static Control protocols are critical for test, inspection, transport and handling of electronic parts (EEE), assemblies and equipment susceptible to ESD damage². The DoD & NASA have adopted ANSI/ESD S20.20 along with the prime contracting community.

To dispel one myth, some COTS are Class 0A (<125 volts), which fall under the same classification for GOTS as ESD sensitive EEE parts sold by authorized distributors. Thus, CubeSat circuit card assembly must not be built on a desktop or in an environment without ESD control protocols.

Learn proper safeguards and witness charge generation and ESD related hazards in an interactive and live presentation.



Bob Vermillion, CPP, Fellow, is a Certified ESD & Product Safety Engineer-iNARTE with subject matter expertise in the mitigation of Triboelectrification for Space, Lunar and Mars surfaces and in troubleshooting robotics, systems and materials for aerospace & defense, hand held devices, wearables, medical device, pharmaceutical, automotive and semiconductor sectors. Bob has co-authored several ANSI level ESD documents and is the former Vice-chair of the ESDA Aerospace & Defense under the leadership of NASA. Vermillion formerly served on the BoD with iNARTE until its merger with RABQSA.

On 21-25 March 2016, Bob trained the NASA Subject Matter Experts (SMEs) for ESD Control, including JPL and UC Berkeley Space Science Laboratory. ESD certification training for UCB Space Science Laboratory is provided every year for the past several years. Speaking engagements include Suspect Counterfeit Training Presentations/Seminars for NASA, DOE, Aerospace & Defense, California Polytechnic University, Loyola University and, most recently, the NASA Ames GIDEP Conference on 4 April 2016. Vermillion is CEO & Chief Technology Officer of RMV Technology Group, LLC, a NASA Industry Partner and 3rd Party ESD Materials Testing, Training and Consulting Company. Bob Vermillion can be reached at bob@esdrmv.com or 650-964-4792. You can also visit our websites at www.esdaerospacetraining.org and www.esdrmv.com

²ANSI/ESD S2020-2014, Section 2.0 Scope