

Lead Free Manufacturing Best Practices to Assure Reliability – Technical Review of the Lead Free Manhattan Project

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Abstract

The integration of lead free materials, components, and processes are transitioning into the electronics industry at a rapid pace. The integration of these new materials and processes create an impact on the reliability of military and high reliability industrial electronic systems. Based on the complexity of these reliability issues and associated mitigation methods, the defense electronics industry is faced with difficult and costly methods and procedures. Implementing lead-free best industrial practices becomes the current solution that will ensure long-term reliability for defense and industrial electronic products.

The dissemination of the best Pb-free mitigation practices was established through the Pb-free Manhattan Project Phase I to mitigate the effects of the worldwide movement to Pb-free electronics. DoD Mission Critical programs are the most susceptible in the worldwide movement to adapt Pb-free processes and materials as the standard in the manufacturing of electronic assemblies. The recommendations made from Phase I have been developed for the purpose of consolidating data and information to assure a minimum risk associated with the use of manufacturing processes which have required modification due to introduction of Pb-free materials.

Phase II of the Pb-free Manhattan Project has identified and recommend remedial procedures to help reduce costs and diminish the technology gap that presently exists with Pb-free. Using the corporate knowledge collected from The Pb-Free Electronics Manhattan Project, a research and development roadmap for future projects was established in each specific area of focus (Design, Materials, Manufacturing, Sustainment, Test, and Reliability) to address the tangible deficiencies.

Finally, the model for the conduct of the Pb-Free Electronics Manhattan project has proven to be a successful method for integrating a diverse body of subject matter experts and creating an environment of synthesized information exchange and capture. It is recommended that this process be identified as a best practice and applied to other pervasive issues.

The presentation will address 1) The present mitigation practices for Pb-free and, 2) the technology projects that must be prioritized to remediate the existing gaps.