

Pb-free Electronics Risk Management (PERM) Consortium

Status

PERM Meeting #10

Crane, IN

September 27-29, 2011

PERM Chairman

“...as a result of European environmental regulations, commercial manufacturers have largely moved away from the use of lead making it more difficult and costly to procure tin alloy parts, and increasing the risk of parts being made with pure tin. Similarly, officials noted concerns with the increased use of lead-free solders used in electronic parts. Moreover, officials told us that when programs do rely on commercial parts, there tends to be a higher risk of lot-to-lot variation, obsolescence, and a lack of part traceability.”

“Space and Missile Defense Acquisitions: Periodic Assessment Needed to Correct Parts Quality Problems in Major Programs,” GAO Report GAO-11-404, June 2011.

Pb-Free Electronics Risk Management (PERM)

CHARTER:

Provide overarching executive leadership and coordination of Pb-free electronics risk management activities for the government and industry, aerospace and defense community

SCOPE/EXPECTED RESULT:

- Responsible for the long-term overall aerospace and defense strategy and tactics to effectively deal with the Pb-free electronics issues**
- Expected result: A coordinated risk management approach for the industry transition to Pb-free electronics**
- Desired end state: As a minimum, lead-free technology must maintain the performance, reliability, and safety characteristics required in aerospace-defense electronics.**

PERM Steering Committee Deliverables

Execute a strategic and tactical plan to effectively deal with the Pb-free electronics risks, addressing:

1. Overarching Executive Leadership and Organizational Framework
2. Communications (both good and bad news)
3. Research Coordination and Funding Plans (information exchange - not funding)
4. Standards and Handbooks with Timely Updates (actionable deliverables)
5. Training Materials and Courses (information exchange – not funding)
6. Advocacy (promote good legislation and discourage the bad)
7. International Coordination (include all stakeholders)
8. Supply Chain Risk Management (the ultimate “solution” may be here)

International coordination network to share plans and progress between the participating working groups, teams, and associations working the issues

Quarterly Progress Reports

How Are We Doing?



Requirements: PERM Documents

RELEASED	
GEIA-STD-0005-1 (US) <i>IEC PAS 62647-1</i> <i>(global)</i>	<i>Performance Standard for Aerospace and High Performance Electronic Systems Containing Lead-free Solder (in revision)</i>
Lead Free Control Plan (LFCP)	<i>Compliance Template for compliance to GEIA-STD-0005-1 (update planned)</i>
GEIA-STD-0005-2 (US) <i>IEC PAS 62647-2 (gl.)</i>	<i>Standard for Mitigating the Effects of Tin in Aerospace and High Performance Electronic Systems (in revision)</i>
GEIA-HB-0005-1 US) <i>IEC PAS 62647-21 (gl.)</i>	<i>Program Management / Systems Engineering Guidelines for Managing the Transition to Lead-free Electronics (revision planned)</i>
GEIA-HB-0005-2 (US) <i>IEC PAS 62647-22 (gl.)</i>	<i>Technical Guidelines for Aerospace and High Performance Electronic Systems Containing Lead-free Solder</i>
GEIA-STD-0005-3 (US) <i>IEC PAS 62647-3 (gl.)</i>	<i>Performance and Qualification Testing for Aerospace and High Performance Electronics Containing Lead-free Solder</i>
GEIA-HB-0005-3 (US) <i>IEC PAS 62647-23 (gl.)</i>	<i>Rework, Repair and Maintainability for Aerospace and High Performance Electronics Containing Lead-free Solder</i>
In Work	
GEIA-HB-0005-4	<i>Reliability Assessment for Aerospace and High Performance Electronics Containing Lead-free Solder</i>

Implementation of PERM Documents

(partial list)

- **NASA Policy Directive, NPD 8730.2C, 11/3/2008**
- **NASA Goddard LFCP Template, 4/8/2009**
- **USAF AA 08-02, 3/31/2008**
- **NAVAIR Instruction, 5/28/2008**
- **NSWC Lead-free Control Plan, 2008**
- **DoD Policy in work (since 2009) – with ELF IPT**
- **FAA AIR 100-2011-120-003, July 28, 2011**
- **EASA Certification Review Items**
- **Various Individual Programs, e.g., MDA, Boeing commercial, B-1, F-18, JAGM, etc.**

Lead-free Electronics Risk Reduction project was generated from LEAP-PERM discussions.

Verification of Compliance to PERM Documents

- **Verification criteria and methods document in work**
- **Preliminary discussions with third-party assessment organization (IECQ)**

Pb-free Issues

- **DoD policy status is unclear**
- **We are “coping” with tin whisker issues**
- **We have not yet seen significant implementation of lead-free assembly solder in ADHP programs**
 - There is no consensus on how to assess reliability of Pb-free solder joints or mixed BGA solder joints
- **Pb-free Risk Reduction project recommended research has not been funded (\$105M)**
- **There is no consensus on how to verify compliance to PERM Standards**
- **COTS issues remain unresolved**
 - Configuration control
 - Reliability assessment

PERM Status

- **PERM is over two years old (first meeting was in May 2009)**
- **PERM has held 10 meetings, with upcoming meetings in January 2012 (Arlington, VA), and May 2012 (Toulouse)**
 - Steering Team to develop roadmap
- **New officers will be selected for 2012-2013**

PERM-EADS Discussions

(7/28/2011)

1. Common Requirements (TC 107)

- **PERM document requirements**
 - Commercial: EASA CRIs, FAA AIR-100, BCA D6-55583
 - Military: Boeing 84761, DoD policy, NATO STANREC
- **Verification of compliance to PERM documents**
- **Reliability assessment and assurance methods**
- **Work directly with supply chain**
 - PERM #10 agenda item
 - PERM document?
 - Key links in ADHP supply chain?

2. Research project (AVSI??)

3. Support for Lead-free Manhattan Project Research

Pb-free Electronics Lessons Learned

1. **Once Legislation is in place that bans a substance, there is no “Undo” Button**
2. **Involve all stakeholders as early as possible**
3. **Visionary leadership required**
4. **Benefited from very active AIA Technical Operations Council and Engineering Management Committee sponsorship**
5. **Need participants that can speak for their organizations (based on personal capabilities and passion, not necessarily position)**
6. **Empower the participants**
7. **Emphasize “Actionable Deliverables”**
8. **Commit to implementing the results**
9. **Need a consistent approach to verifying compliance**
10. **What began as an electrical engineering problem is actually a deep metallurgical science and mechanical engineering challenge**
11. **We’re still learning!**

What We Need

- **Reliability**
 - What is the impact on ADHP products?
 - What do we know (and don't know?)
- **Supply Chain**
 - What knowledge and data do we need?
 - What parts, materials, designs, processes would we like to have?
- **Part Changes**
 - What is required for certification?
 - What is not required for certification?