

Tin Whiskers

For Release

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Milpitas, CA

The world-wide environmental mandate to eliminate Pb in electronic assemblies has resulted in Sn and Sn alloys becoming the replacement to Sn/Pb solder.

Pure tin possesses a high reliability risk due to migration of the tin, commonly known as “tin whiskers”. Tin whiskers grow spontaneously within pure tin coatings as single crystalline structures which are electrically conductive. Tin whiskers can grow to several millimeters in length. Tin whiskers were first discovered in electronic equipment in the early 1940’s.

Tin whiskers can cause two major reliability problems:

- Electrical shorting inside electronic components
- Mechanical problems found from generated debris

The commercial market place at large is typically not severely affected by tin whiskers, since tin whiskers generally manifests itself outside of the usual product reliability window. Tin whiskers can become a severe problem in high reliability applications with long life cycle expectancies. Since 1988 several military weapons systems have failed due to tin whiskers. Failures have also been documented in the medical, aerospace, and energy fields. One of the most notable recent tin whisker related failures has been dubbed “The Day the Pagers Died”. On May 19, 1998, the \$200,000,000 Galaxy IV communications satellite which serviced 90% of the pagers in North America and several broadcast networks, became space junk.

Common mitigation practices such as nickel barrier, conformal coating, reflow, etc., cannot effectively eliminate tin whiskers. The primary way to reduce the risk of tin whisker induced failures is to avoid the use of tin plated components. Unfortunately, many of today’s commercial off-the-shelf electronic components (COTS) already have tin plated leads. For tin plated components which are to be used in a high reliability and long life cycle applications, Six Sigma strongly recommends hot solder dipping the component’s plated leads using tin-lead solder to completely reflow and alloy the tin plating. Six Sigma has been hot solder dipping components for military and aerospace contractors since 1989. Our reputation is second to none. Six Sigma will take the guess work out of determining whether or not your procured COTS components have the potential for tin whiskers. Six Sigma can analyze the lead finish in our state-of-the art reliability lab and report our findings and recommendations to you in a timely manner. For additional technical assistance or quotation, call us at (408) 956-0100.

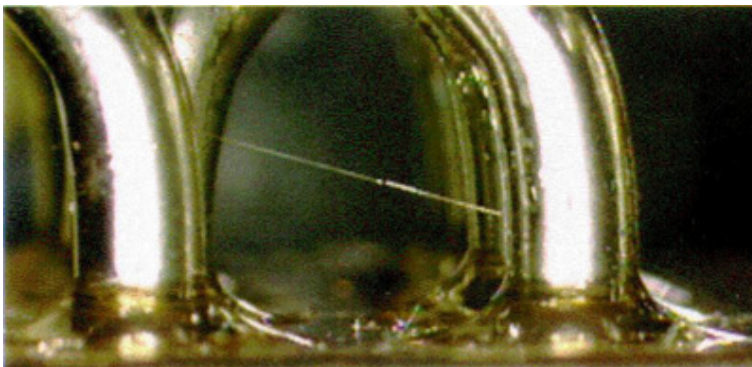


Photo Courtesy of Andre Pelham (Intern)
NASA Goddard Space Flight Center

Tin Whisker shown above growing between pure tin-plated hook terminals of an electromagnetic relay similar to MIL-R-6106 (LDC 8913)

To learn more about Six Sigma's Lead Tinning Service, visit <http://www.sixsigmaservices.com/leadtinningservice.asp>

For detailed scientific information on tin whiskers, visit <http://nepp.nasa.gov/whisker/background/index.htm>

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