

# Robotic Solder Dip Solves Tin Whisker Problem

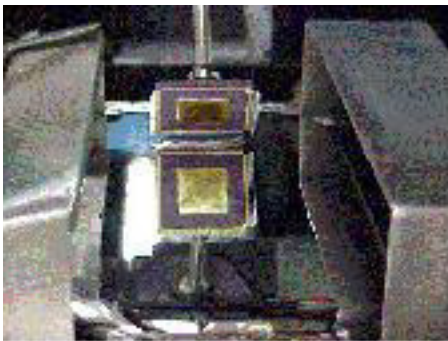
S1057 - Tin Whisker Mitigation



## Objective

The rapid rise of a worldwide lead-free movement driven by strong legislative and market forces is causing manufacturers to rid their products of lead. As a result, many electronic component manufacturers are transitioning from tin-lead surface finishes to pure tin. Pure tin components are known to cause tin whiskers. Tin whiskers are electrically conductive hair-like filaments of pure tin that “grow” over time, often in large quantities, from any type of hardware that has been coated with a pure tin finish. Tin whiskers have been responsible for many electrical shorting failures, with an estimated loss of at least a billion dollars worth of satellites, missiles, and other electronic equipment.

Robotically controlled solder pot dips have been shown to successfully replace pure tin plating with a tin-lead solder coat on 100% of a component’s lead surfaces on selected components. It was not well understood which types of component packages could be successfully 100% solder pot dipped without collateral damage to their reliability from thermal shock. This ManTech project specifically addressed this problem.



## Payoff

This project has successfully provided a qualification of the robotic solder dip process on a variety of electronic packaging designs. It has identified which types of tin-plated component packages can be successfully solder pot dipped to remove all the tin plate and still meet military reliability requirements. The process will allow many programs to avoid

costly redesigns and production interruptions.

## Implementation

The project report will provide users with the detailed information needed to employ the qualified process in their programs for the part types successfully tested, should they so choose. A number of companies provide robotic solder dipping services. It would be the responsibility of an individual program to verify that a solder dip vendor is capable of meeting the process requirements. A separate commercialization experiment, funded and conducted by an industry participant, is piloting the creation of a niche industry that would allow their programs to purchase tin-plated components from a parts distributor, have them routed to their qualified solder dip vendor for dipping and then delivered directly to the program as tin-lead finished parts.

## Period of Performance

Jan. 2004 to Jan. 2005

## Platform

PEO (Ships)  
PEO (Carriers)  
PEO (Subs)  
PEO (T)  
J-UCAS

## REPTECH

Business Enterprise  
Other

## Stakeholder

PEO (IWS)

## Performing Activity

BMPCOE

## Point of Contact

Dr. Anne Marie SuPrise  
(301) 405-9990  
annemari@bmpcoe.org

## Total ManTech Investment

**\$1,000,000**