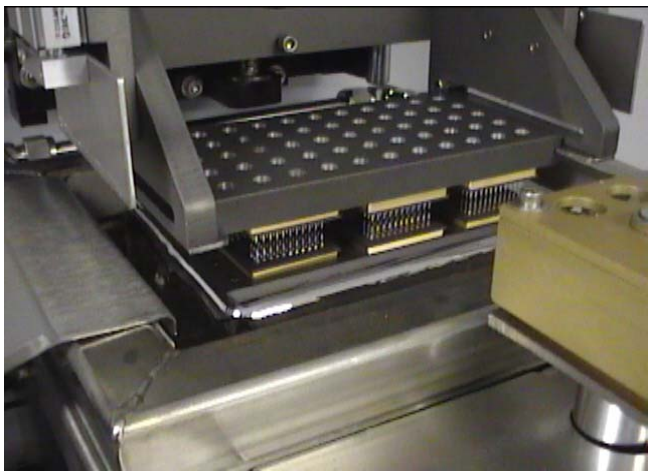
# Four Key Reasons Why Lead-Tinning is 'Hot' Right Now

*By Alan Cable, President*

Lead tinning has experienced a surge in popularity recently for a number of reasons, a leading one being RoHS and the need for hard-to-find components with tin/lead lead finishes by hi-rel electronics manufacturers.

The need for lead tinning has been around for nearly 25 years now. The original need arose when the military decided that plated finishes – which are not fused – were not suitable or acceptable for hi-rel environments. The problem, at the time, was that plated finishes were found not to be robust enough to withstand oxidation encroachment to the base lead, and could result in a solder joint failure in the field. That process gradually diminished in necessity over the years, but now it has come back for that reason as well as for others.

There are primarily four reasons why hot solder dipping has come back into use today. The first reason is for legacy components, those that might have plated finishes on their leads and need to be dipped for the same original reason, i.e., applying a robust fused solder finish.



*Solder Dipping with the ACE Lead Tinning System (LTS).*

The second is that it is a good way to 'scrub' the gold off component leads, gold that has been plated onto them initially to help them stand up to the rigors of the burn-in process. That gold must be removed, because it can cause gold embrittlement in the solder joint if it remains. Removal of gold is achieved by hot solder dipping to 'wash' the gold off.

The third reason is mitigation of tin whiskers, something everyone seems rightfully concerned about these days, in the conversion to high tin content lead-free alloys. Even NASA has published papers that say, in effect, that the only reliable way to mitigate tin whiskers and prevent their growth is to dip the leads in molten alloy. This creates a 'fused' intermetalic finish that is unlike the non-fused electroplated finishes, which are a lot like a coating of sand– not fused or connected and prone to tin whisker development under certain conditions.

The fourth and last reason, for the hi-rel environment, is the conversion of components to compatibility with tin/lead assembly. Since RoHS, there are fewer and fewer components available in stock with tin/lead lead finishes, so they must be hot solder dipped in a tin/lead bath to make them suitable for assembly in hi-rel products. Hot solder dipping, done properly, will 'wash' off the tin so that the leads can be properly re-plated with tin/lead.In an automated lead tinning system, this must be done with a 2-pot system; one pot absorbs the contamination, and its purity must be monitored, and it must be exchanged for a fresh pot when the level of gold or unwanted material reaches a certain saturation point.

Then, a second or 'virgin' pot must be used to re-plate the leads with fresh and uncontaminated material. One does not try to do this all with one pot! Of course, the reverse is also common - tin/lead plated components are 'scrubbed' of lead and re-plated with tin for use in RoHS-compliant assemblies, using two tin pots in succession.

There are a few basic but very critical requirements for a successful automated lead-tinning process. As mentioned above, dual solder pots are a must – one for the cleansing or scrubbing, and a second 'virgin' pot for re-plating with the correct alloy. The second requirement is a flowing, not a static, solder pot, since the flowing solder, particularly in the scrubbing pot, removes contaminated or scavenged material such as gold from close proximity to the leads, so that the contamination will not be pulled back to and deposited onto the component lead when the component is pulled out of the solder. It's also important to have some sort of agitation in the first, or scrubbing, pot as this actually helps the removal of gold or lead solder from the leads. This can easily be accomplished with mechanical manipulation of the device holding the component in the bath.

The use of nitrogen blanketing or inert atmosphere in the second, or finishing pot, is desirable because it promotes a lustrous finish, and mitigates dross formation, as well as the formation of icicles and bridging.