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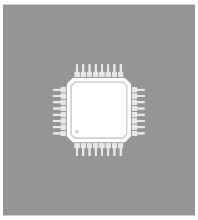
components upgrading solutions

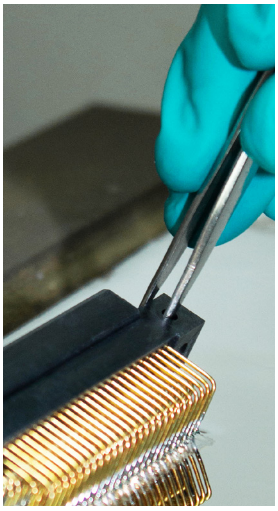
Electronic component technology



The key points to re-tinning electronic components

The RoHS directive upset the world of electronics by banning the lead that was part of many alloys. Previously, components were only re-tinned in rare cases, for example, to remove the gold from the component tabs to make the soldering more reliable. One of the main virtues of lead is the much lower re-soldering temperature of electronic boards than for pure tin (in the order of 215°C instead of 240°C) and the absence of whiskers, a mono-crystalline structure that grows on pure tin soldering over time which can create short-circuits.

RE-TINNING CONSTRAINTS



The use of leaded components being reserved for an increasingly rare number of waived activities, electronic component manufacturers tend to remove these component versions from their catalogues, which generates reliability problems since a solder containing less than 3% of lead is considered to be a potential cause of whiskers. Two techniques were developed when lead-free components and processes made their appearance: the FORWARD process (use of lead-free alloys with a leaded finish component) and the BACKWARD process (use of leaded alloys with a lead-free finish component).

For the first, which often concerns RoHS products, you need to make sure that the lead added by the component finish is compatible with the directive, which is often the case. You should also make sure that the component can withstand lead-free process temperatures (forward compatibility).

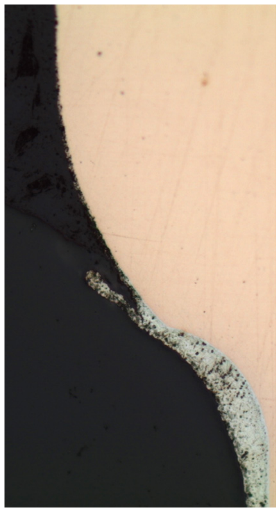
For the second process, this will mainly involve checking that the soldering is consistent and that the component finish is properly re-melted.

BENEFITS OF COMPONENT RE-TINNING

For the forward process, the interest of re-tinning comes from the reduced quantity of lead in the component. The component terminals will successively be dipped in two pure tin baths; the first to clean it, the second to tin it.

The effect of this process is to dilute the lead (which does not completely disappear), to bring its proportion to less than 1% in the terminal finish, which, considering the component weight, will lead to an overall lead content of less than 0.1%.

For the backward process, this involves adding lead to the component finish to prevent the growth of whiskers. The passage of the component terminals in the two baths will allow to add lead representing a final content in the order of 20 to 35%. For this addition to be effective against whiskers, make sure that it covers the entire component tab, without leaving any pure tin zones, but also that the operation, due to the proximity of the melted alloy to the component body, does not create any stress that may jeopardise its reliability.

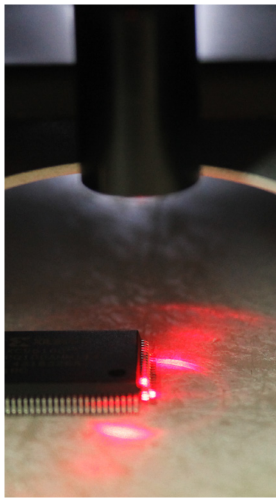


RE-TINNING CHECKS

All processes are the subject of checks. To make sure that the component is not subjected to stress and the re-tinning will be correct, upstream of a serial re-tinning the operation is carried out on a sample of the product to check:

- that there is no delamination or that delamination is acceptable for plastic components (using acoustic microscopy),
- the intermetallics created by the operation (by cross-section and inspection using and optical and/or electronic microscope),
- the finishing lead content (using X-ray fluorescence),
- the component solderability (wetting balance).

In the series phase, the components are visually inspected under a binocular to check that there are no bridges between the terminals, no solder balls and no flux residue. The tinning baths are the subject of regular checks of their pollutant content and temperature.



STANDARDS

J-STD-001: bath purity
J-STD-002: solderability
J-STD-020: MSL levels, delamination criteria

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