md News
Medical Design

The Truth About "Lead -Free"

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OEM's in all industries are seeing a lot more of the term "lead free." It's not surprising when you consider deadlines are quickly approaching for adherence to the Directive on the Restriction of Use of Certain Hazardous Substances (RoHS) and Directive on Waste Electrical and Electronic Equipment (WEEE). A whole new industry has popped up to address the implications of these European Directives. All of this activity has produced some interesting and widespread misperceptions regarding products labeled lead-free.

Here are a few of the most common misperceptions:

• My products are clearly covered under exemptions within RoHS and therefore will not to be affected for quite some time.

• My Electronic Manufacturing Service provider is going to take care of this for me.

• This is much ado about nothing. Lead in electronics is minimal.

While these misperceptions have a thread of basis in fact, they are nonetheless misperceptions, and serious at that. The most serious is the first, "My products are exempt." There is a huge difference between being exempt and not being affected. Some general exclusions outside the legislative scope include automotive, aerospace, and military equipment. Batteries, which are covered under battery regulations, are also excluded from RoHS. Medical equipment (other than monitoring and control instruments and those which are implanted) is temporarily exempt.

So let's assume you fall comfortably within the exemption. How will you be affected?

• Your supply chain is changing at this very moment. As over 80% of the Electronic Manufacturing Services market changes over to lead-free processes, most contract manufacturers are beginning their transition to a lead-free manufacturing environment. Ask your EMS partner for their lead-free roadmap. At what point do they make the transition to lead-free? What impact does that have on your products?

• Component manufacturers have already taken huge measures to address RoHS compliance. Some are offering lead-free alternatives. Some have issued end-of-life notification for their tin-lead offerings while others have simply changed their 'standard' metallic finish without rolling revisions or notifying customers. Without you knowing it, the components on your product today may be different from the components shipping on your product six months ago.

• How will the changing of components affect the performance of your products? How is the reliability of your products affected? What impact does this have on the regulatory approvals that your products have won with lead-containing solders, components, and PCB's? Do these changes require you to resubmit? See the IPC Solder Products Value Council (*www.ipc.org*) for one ongoing study on the reliability of lead-free solder joints.

•As component-manufacturing processes change, so does component performance. Some as a result of the shift in final finish, but others more commonly are changing due to a change in manufacturing plant and process. While some variations are negligible, others are issuing new data sheets to reflect the changes in performance and tolerance.

Many OEM's have looked to their EMS providers for solutions. While most PCB assembly shops have taken steps to understand the challenges of lead-free assembly and rework, most feel that the challenge ends there, with the ability to assemble a lead-free product.

Consider asking your assembly partner these questions:

• Are you changing your solder paste to a

lead-free alloy?

• What do you recommend changing on my PCB fabrication notes? A common error is to assume that changing a call out from tin/lead to immersion silver or nickel/gold will solve the issue from a bare PCB perspective. Lead-free solders and multiple rework cycles call for higher reflow temperatures and may require a change to your material laminate specification.

• What about my components? Most designs were reviewed for temperature sensitive components in early design stages. Most were performed many months or years earlier at lower reflow temperatures. Because lead-free solders have higher melting points, there are implications for every stage in the PCB manufacturing, assembly, and testing process. The simultaneous phasing out of brominated flame retardants means that the issue of flammability at higher working temperatures will be critical. Many replacement flame retardants have a lower temperature range.

• Consider also the compatibility of lead-free solders with existing components and coatings. A range of components — from plastic encapsulated devices to capacitors, LED's, electromechanical components and connectors — may not withstand higher process temperatures required for lead-free solders. Although thermal stress on components is being addressed through soldering flux and equipment developments, some components will need requalification to withstand higher temperatures, which is time-consuming and expensive. There may also be some impact on component lifetimes.

The final misconception suggests "this is much ado about nothing. Lead in electronics is minimal." It is true that the US electronic interconnection industry uses less than 2% of the world's annual lead consumption. It is true that the lead used in U.S. printed-circuit board (PCB) manufacturing and electronic assembly produces no significant environmental or health hazards. But it is also true that RoHS and WEEE are here to stay and they affect the entire electronics industry. These regulations set out to create a more efficient product life cycle to stem the tide of electronics in landfills. All companies, large and small, producing electrical and electronic products, components and sub-assemblies, have to comply with WEEE by August 2005 and RoHS by July 2006.

The WEEE directive requires producers to pay for at least the collection of their products at end-of-life from central points and meet targets for re-use, recycling, and recovery. The RoHS directive means products containing restricted substances will have to be redesigned or withdrawn by July 2006. The RoHS directive is complimentary to WEEE and seeks to reduce the environmental impact of WEEE by restricting the amount of certain hazardous substances that may be present in products to certain maximum concentration levels. It applies to the same categories of products defined by the WEEE Directive, with the exception of medical-equipment systems and monitoring and control equipment. Beginning July 2006, producers will need to demonstrate that their products do not contain more than the maximum permitted levels of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE), which are currently used as flame retardants. It is proposed that the levels are 0.01% by weight for cadmium in any individual homogenous material and 0.1% for the other substances.

We are all affected by this legislation. We are in this together. The intent is that these changes will have positive impacts on our planet for future generations. Communication, education and planning are key components to making a successful transition. Start planning today for how these changes effect your product tomorrow.

Hunter Technology Corp. provides PCB design, fabrication, and assembly to OEMs.