Guest View

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Leading the Lead-Free Transition

A look at how lead free is changing the assembly landscape.

As we move closer to 2006—the lead-free enforcement date of the WEEE and RoHS Directives—leading original equipment manufacturers (OEMs) and electronics manufacturing services (EMS) companies are getting ready for lead-free printed circuit board (PCB) assembly in volume manufacturing. A number of changes are taking place in the worldwide lead-free landscape to ensure a smooth transition.

From Labs to the Manufacturing Floor

Efforts are being shifted from research and development (R&D) to implementation and from developmental labs to the manufacturing floor. Of course, more fundamental research is needed to better understand the mechanical properties of the leading lead-free solder alloys—such as Sn-Ag-Cu—as well as the complex issue of tin whisker growth.

While research in these areas may go on for decades, a large volume of developmental work from the industry and academia worldwide has already enabled lead-free PCB assembly in volume manufacturing. Solder alloys and pastes have been evaluated; PCB surface finishes studied; reflow, wave soldering and rework processes developed; and reliability tests performed. The task ahead is to implement the processes on specific products.

From Low to High Volume

Many companies have already implemented lead free on selected products to gain confidence and experience, primarily with consumer products. Over the next few years, most new product launches are anticipated to be lead free, and long lifecycle products will need to be designed with lead-free and hazardous substance compliance in mind.

To further complicate the situation, OEMs may take different positions regarding the exemption of hazardous substances. Some may decide to move ahead regardless of the temporary exemptions, while others may take advantage of the exemptions and take a phase-in approach. Clear and frequent communication between OEMs and EMS companies to better align lead-free implementation roadmaps is critical.

Shift in Focus

As the transition takes place, the focus needs to shift from technology to engineering to operations and from capability—"Can you do it?"—to capacity—"How many of your lines are capable?" Operational issues need to be carefully worked out to ensure that the manufacturing floor is ready to run lead free. Design guidelines, oven capability and upgrades, solder paste and flux vendor capability, pricing and delivery, component procurement specifications and vendor qualification, inspection machine readiness, materials handling, tracking and logistics are some of the key issues. Specific local work instructions need to be in place for lead free.

Materials and product segregation during the transition are of great importance. Global best practices can help diffuse the knowledge and expertise in lead-free implementation across factories within the company.

Role Changes

As the focus changes, so do the roles of the teams within the company. Corporate R&D teams, which have so far played a leading role, will now need to support regional and factory engineering teams and program management teams. Customer- and product-specific applications are becoming the topic of the day. Global teams have worked well up to this point, and now customer-focus teams are needed as well.

Communication channels may also need to change. The communication channel has primarily been between the EMS and OEM corporate technology teams. Now, more communication needs to take place between EMS program management teams and OEM commodity and procurement teams.

Beyond Lead Free

Lead-free implementation readiness and RoHs compliance is becoming a critical capability for OEM and EMS companies. RoHS is not just for individual companies; it is for the entire industry. Supply chain compliance and assurance management are complex undertakings that the entire industry needs to work on. Finally, compliance is extending past the European Union and becoming global. For example, the Chinese version of RoHS is already on the horizon. A clear definition of compliance under each national or local legislation will help to ease the transition.

Design for the environment (DfE) and recycling are the ultimate solutions to the environmental issues posed by the ever-increasing volume of electronic products. ■

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