



BEST, Inc.

Lead-Free Roadmap



| | |
|--|---|
| BEST, Inc. Lead-Free Compliance Position..... | 3 |
| Lead-Free Team Formed October 2004..... | 3 |
| Training Department Lead-Free Roadmap..... | 3 |
| Products Department Lead-Free Roadmap..... | 4 |
| Operations Department Lead-Free Roadmap..... | 4 |
| Material Control..... | 4 |
| Hand Soldering Control..... | 5 |
| Solder Fountain/Selective Soldering Control..... | 5 |
| Reflow Soldering Control..... | 6 |
| BGA Rework Control..... | 6 |
| Quality Assurance/Inspection Control..... | 6 |

BEST, Inc. Lead-Free Compliance Position

BEST, Inc. provides the electronics manufacturing industry with training solutions, rework and repair services, and products such as solder training kits, PCB repair kits and StencilQuik™.

As a service provider, BEST must respond to customer demand. Although BEST provides many services, the services that have the greatest impact on the lead-free reduction/elimination process are Rework & Repair, BGA Rework, and small-run prototype builds. Our reduction and elimination of tin/lead solder from these processes will be determined by the demands of our customers.

BEST will provide services for three groups of customers:

- Those that require rework of assemblies manufactured with tin/lead solder.
- Those that require rework of assemblies with both tin/lead and lead-free solders.
- Those that require rework of assemblies with lead-free solder only.

When the entire customer base completes the transition to lead-free solder, BEST will be fully compliant with the RoHS requirements.

Lead-Free Team Formed October 2004

A lead-free implementation team was formed in October of 2004 to investigate the transition to lead-free processing. The team members included key personnel from Senior Management, Training, Products, and Operations. The resulting strategies of the team meetings are outlined in the following sections.

Training Department Lead-Free Roadmap

At this point in time, all training services performed by BEST have been located in North America and Mexico. Some of the training customers have traveled from Asia and Europe for training performed in the United States. As many of BEST's customers will continue to use tin/lead solder in their manufacturing operations, it is likely that they will want to continue to have training that reflects that process. It is also anticipated that many of BEST's customers will have product sales in the European Union and Asia and will require training and training materials that conform to the policies for those locations and processes. With this in mind, BEST will continue to offer all existing training programs with tin/lead materials. BEST has already developed and is ready to deliver training that is based on the use of lead-free solder and its processes. All training materials used for any lead-free solder training will be RoHS compliant.

Products Department Lead-Free Roadmap

BEST has several product lines that are offered to the electronics manufacturing industry. The products fall into one of two categories. The first category is training products. This category includes various types of soldering training kits. Since the beginning of 2005, BEST has been delivering training kits and materials that contain lead and training kits and materials that are lead-free. The second category is manufacturing products. These products include StencilQuik™, Repair kits, circuit frames, and lead detection kits. BEST repair kits and circuit frames are already lead-free and fully RoHS compliant. The lead detection kits are an easy way to identify the presence of lead in a variety of materials. StencilQuik™ is a laser cut, adhesive backed polyimide stencil that is fully RoHS compliant and can withstand the additional heat from the lead-free soldering process.

Operations Department Lead-Free Roadmap

BEST provides rework and repair services to a variety of customers (automotive, telecommunications, medical, and defense). These services include simple component replacement, engineering changes, repair of printed circuit board anomalies, and complete assembly of prototypes, engineering models, and full-scale production printed circuit assemblies. It is anticipated that many BEST customers will not be exporting any products to the European Union or Asia and their products will be distributed domestically. It is also expected that many BEST customers will be exempt from RoHS compliance (medical & defense). Some of BEST's customers have encountered procurement problems because some of their parts are only available in a lead-free configuration, but they are still processing their assemblies in a tin/lead process. Some BEST customers have already transitioned their processes to provide for full RoHS compliance.

This mix of customer requirements results in material control being the most important aspect of the BEST Operations Department services. It is reasonable to assume that during the processing of customer supplied product, there may be occasions when several different materials are in use at the same time from different customers. The critical concern is the control of materials to prevent cross-contamination. The following sub-sections will describe the methods used for control of each of the rework and repair processes.

Material Control

Printed circuit boards, components and other parts of the assemblies are normally specified and provided to BEST by the customer. In the majority of cases, the only material that BEST procures and adds to any assemblies is solder. All BEST work orders will contain material requirements for processing. Technicians will have to draw the correct solder from Material Control to perform the designated operations. The technician and Material Control will both verify and initial the documentation to indicate the correct solder has been withdrawn. Upon

completion of the job or the end of the technician's shift, the solder will be returned to Material Control.

Hand Soldering Control

With the exception of temperature, there is very little difference in the hand soldering process of lead-free solders when compared to tin/lead solders. What differences there are can be addressed by slight changes to the selected temperature of the soldering iron and the type and volume of flux. BEST will utilize employee training to ensure that all technicians are proficient at performing hand soldering with both tin/lead and lead-free solders and they are aware of the differences. The hand soldering stations and equipment will not be designated for use with a particular solder. All soldering iron tips can be used for both tin/lead and lead-free soldering. The only difference in the "lead-free" soldering iron tips is the thickness of the surface finish of iron plating. "Lead-free" soldering iron tips will typically have a greater thickness of iron plating to prevent premature failure of the plating due to the aggressive effects of the lead-free solder. A possible source for cross-contamination of solder would be using the same soldering iron tip for either solder without first totally removing the previously used solder from the tip. A common practice to maintain the integrity of the soldering iron tip is to apply a quantity of solder to the hot soldering iron tip. This molten solder acts as a barrier between the atmosphere and the hot soldering iron tip and prevents the build up of oxides on the tip. Prior to soldering, the hot soldering iron tip is wiped on a clean moist sponge to remove the molten solder and any oxides that have formed and this results in a clean oxide-free surface on the tip for the soldering operation. Prior to switching from tin/lead solder to lead-free solder using the same soldering iron system, a purge of the tip should be performed. This purge procedure is performed by first wiping the hot soldering iron tip on a moist sponge and then flooding the hot tip with the solder that is to be used for the next operation. The flooding of the tip should include all areas of the hot tip that have a wettable surface and can hold solder. This flooding procedure should be repeated two more times and then the iron can be placed in the holder for use. This purge operation will serve to remove any trace amounts of the previous solder that might otherwise have contaminated the new solder.

Solder Fountain/Selective Soldering Control

Administrative control of the solder fountains will be used to ensure there is no cross-contamination of solders. BEST has one solder fountain dedicated to lead-free solder and one solder fountain dedicated to tin/lead solder.

Reflow Soldering Control

The reflow oven used at BEST can be used for either lead-free or tin/lead processing. Generic profiles have been developed for both lead-free and tin/lead assemblies.

BGA Rework Control

All BEST BGA rework systems are capable of processing lead-free BGAs. Material control of solder will be accomplished in the same manner as for hand soldering.

Quality Assurance/Inspection Control

BEST personnel are trained in the appearance and acceptability of lead-free solder joints.