How do manufacturers inspect BGAs?

Jon Titus - February 01, 1999
and the prospect of improving their production processes.

can resolve down to 0.1 micron, which will suit newer chip-scale packages.

manufacturers with additional information. His company offers a proprietary scanner that employs scanning moiré interferometry (SMI).

Not everyone agrees that the need for 3-D measurements will ebb. Arye Malek, vice president of marketing at PPT Vision ... view. He feels that a fast 3-D inspection system that scans 100% of the BGAs coming out of production can provide

To overcome the limits of the three-point seating-plane technique, inspection-equipment manufacturers may offer a ... calculation locates the tops of the three highest balls and calculates the equation that represents a plane through those

The 3-D inspection checks the coplanarity of the solder balls to be sure the tops of the balls are within either 6 or 8 ... customer's requirements. If the tops extend outside of that range, the BGA may have a problem that could prevent all the

If the manufacturing processes warp a BGA slightly, some solder balls may not properly attach to pads (Fig. 3). Resoldering balls that contain defect-free BGAs can be expensive, so manufacturers use only top-quality BGAs that meet or exceed their specifications.

inspection systems on a BGA manufacturing line.

Fig. 2 BGA, in a make-to-order context to external contracts through lead notices and a subassembly, usually a thin PCB. As much material consists of the assembly.

inspection systems examines the bottom edge of the PCB. The inspection system may be configured to inspect the solder connections individually or in groups of the same size and type. The system may check the placement of the solder balls to ensure that they are in their proper locations and that they are the proper size. The system may also check for any missing or extra solder balls, as well as extra solder balls that may have fallen onto the BGA.

Fig. 3 BGA manufacturers often buy second-placed equipment that incorporates inspection equipment. Inspection systems also examine individual solder balls as well as solder balls in groups. The system may check the placement of the solder balls to ensure that they are in their proper locations and that they are the proper size.

Fig. 1 A BGA is nothing more than a small piece of material onto which a manufacturer places an IC die (Fig. 1). The system may come as part of the BGA assembly equipment, or the BGA manufacturer may have added it later. Many companies supply complete inspection systems as well as individual machine-vision components.

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