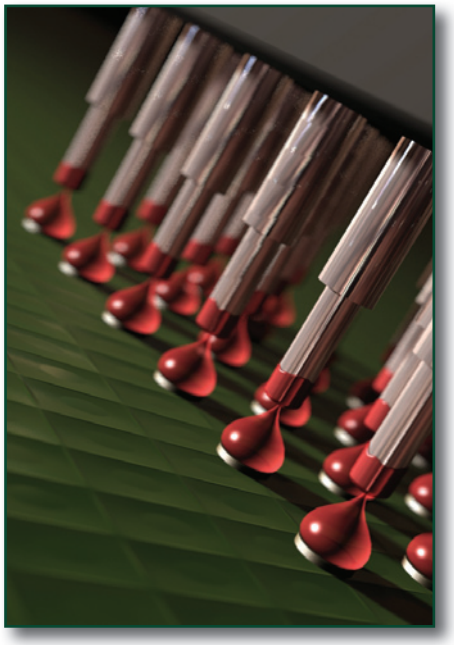
Variables of Pin Transfer

APPLICATION NOTE

Pin Transfer Basics

Pin transfer is a way of selectively depositing a semi-solid or liquid material (like a solder paste or ball-attach flux) onto a substrate. It is commonly used to apply flux to BGA (ball-grid-array) pads to promote subsequent solder sphere attachment. Pins are dipped into a reservoir of material so that the pins are coated with flux, paste, or epoxy. Next, the pins are lifted out of the material reservoir and lowered down onto the BGA pads. A portion of the material that is transferred by the pins sticks to the pads as the pins are lifted away. This repeatable method is used extensively in semiconductor packaging because it deposits flux very quickly and can compensate for changes in the height of the substrate.

Pin transfer fluxes are specially designed with rheological characteristics to help optimize the amount of material that is picked up and placed on the pads. Pin blocks are also used to transfer other materials, such as solder paste and epoxies, in a range of applications. Since this is a fairly basic process, it is easily controlled through knowledge and optimization of equipment and parameters.



Process Control

The amount of flux that is transferred by a set of pins can be altered by making changes to the equipment or equipment parameters. Equipment modifications to increase flux transfer include:

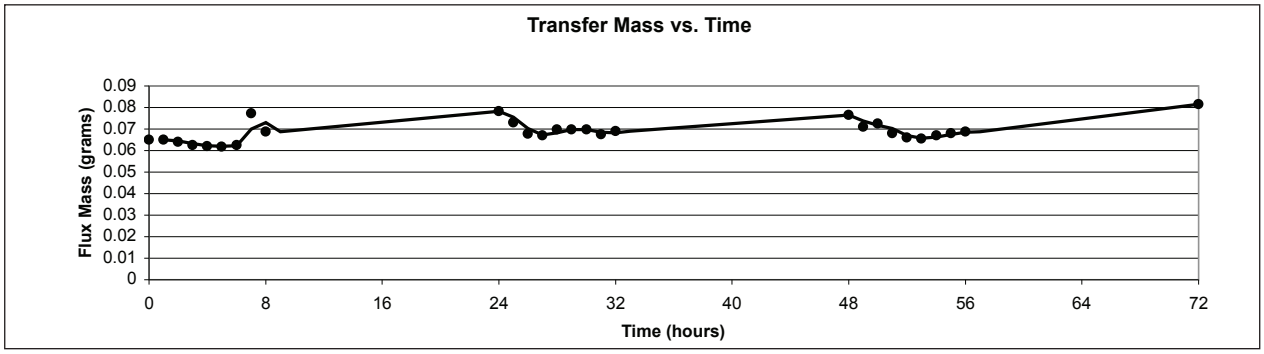
- Increasing reservoir depth
- Increasing pin diameter
- Utilizing different pin geometries

Process modifications to increase flux transfer include:

- Extending pin dwell time in flux reservoir and on pads
- Decreasing lift-off speeds
- Decreasing shear rate

In addition to process and equipment variables, the working life of a flux can also affect the volume of flux that is transferred over time, and because flux is thixotropic, its viscosity can change with shear stresses.

The graph represents the volume of flux that was transferred over three days by a no-clean flux. Notice the variation over time, which was caused by the thixotropic nature of the flux during cycles of 8 hrs of shearing and 16 hours of relaxation. This level of variation is not a cause for alarm, although it can be reduced by continuous operation and regular flux replenishment.



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