A New Stenciling Method for Reworking SMT Components

Bob Wettermann

When reworking more complex SMT components such as finer pitch SMT components, SMTconnectors and even area array devices, the most common method of printing on the printing selectively on the PCB has some serious shortcomings. The most significant problems incurred with this method includes the lack of co planarity between the stencil and PCB, holding the stencil in position during the printing process, the large space taken up by the metal stencil/fixturing system and the cleaning required. These problems all lead to a decrease in yield.

A recently developed new stenciling process overcomes these deficiencies resulting in better yields, faster rework times all while simplifying the rework process.

Problems with Metal Stencil Rework Printing Process

Coplanarity

One of the problems ii using metal rework stencils is the lack of co planarity between the metal stencil and the PCB. Without intimate contact between the metal stencil and the PCB in all areas in around the areas which will be printed, poor print quality is a result. Solder paste can "bleed" or leach underneath the stencil if it is not perfectly coplanar or the board area being reworked is slightly warped. Some users will tape or fixture the edges of the rework stencil to the board as it may "fold up" along the edges and cleaning of the stencils.

Holding Alignment

Typical rework stencils require taping or special fixturing to position them and hold them in place. This takes up additional real estate on the PCB which in some cases is unavailable. In addition the metal fixturing systems carry with them a one time cost making them a pricey alternative if little rework of a given pattern is going to be done. Any taping required to hold down the metal stencil requires extra processing time for each and every board location being reworked. This operation in itself is highly operator dependent thereby impacting the yield.

Space

Metal stencils take up a significant amount of real estate relative to the area being reworked resulting in this method not even being an option for rework for some rework locations. Between the supporting fixtures and the peripheral areas of the stencil required for taping down the stencil metal stencils in many cases are just too large for the rework area. Couple this with the space constraints of shrinking PCB real estate and the time for an alternate method of printing has come.

Cleaning Impacts and Cleaning Time

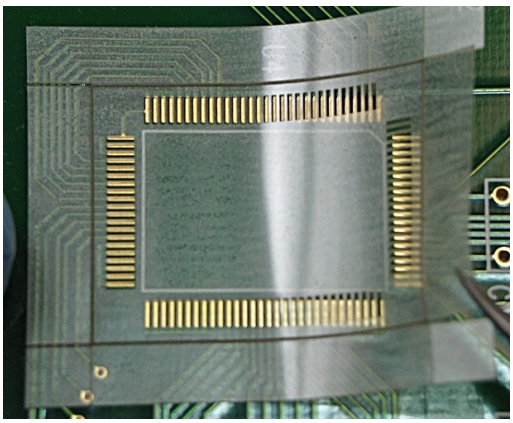
The cleaning of metal rework stencils leads to not only the deformation of the stencil but it also consumes rework technician time. When cleaning metal rework stencils and the associated fixtures, care must be taken in order to avoid deforming the stencils and fixtures. In addition the aforementioned problems of damaged stencils can occur when proper handling techniques are not used. The lack of metal stencil coplanarity causes poor paste print release, as there is the lack of a gasketing effect. In addition, solder paste can spill out over the sides of damaged metal stencils thereby contaminating the circuit board. In addition to the yield impact of damages stencils, metal stencils require meticulous cleaning and therefore the processing time is increased.

New Method Solves Many Problems

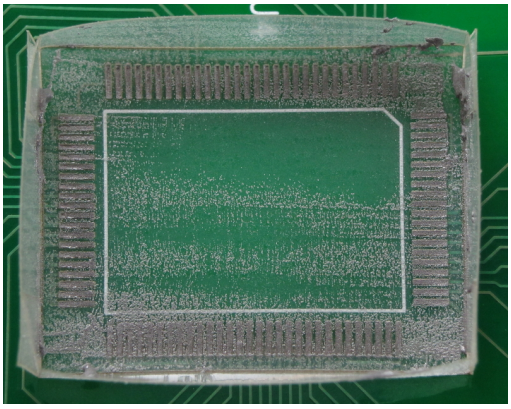
In this new rework printing method a single-use Mylar stencil with a "sticky tack" backing is used to simplify the process, increase yields while being able to get in to the smaller areas required in some situations.

This method consists of the same basic steps as the existing metal rework stencil printing process albeit with some major refinements. The process is outlined below:

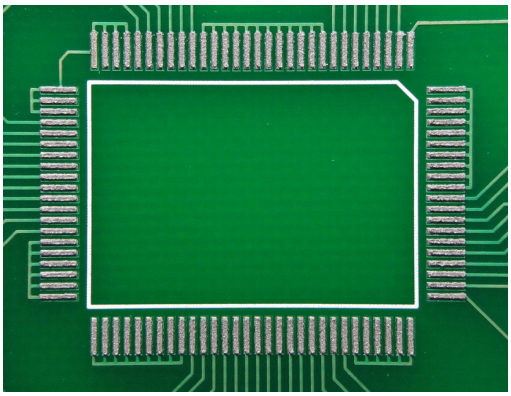
After site preparation the stencil is peeled off its liner material, aligned over the pads and pressed in to position. With the softness of the "stick back" adhesive the stencil can be maneuvered back and forth until the final, micro adjustments for alignment are made.



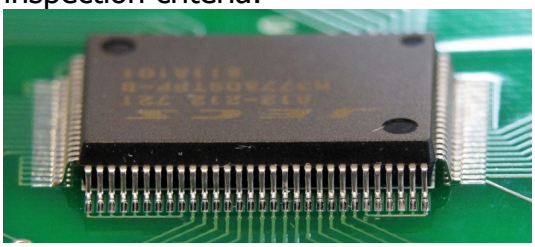
Next, solder paste is rolled in to the apertures. Multiple passes, allowed by the fact that the stencil is temporarily stuck to the PCB, allow for consistent paste volume to fill the apertures. The flexibility of the material along with the adhesive backing allows for the stencil to work well in and around board locations which are warped. The boarder around the stencil (if room allows) acts as the masking tape eliminating the need for this extra step as in metal stencil printing process.



Next, the stencil can be peeled off resulting in a very consistent print volume. The stencil is designed to be discarded thereby bypassing the cleaning process and all of the problems aforementioned above.



Lastly, the device can be placed onto the printed areas, reflowed, cleaned and inspected per inspection criteria.



This new rework stencil method solves several of the major problems associated with metal rework stencil printing. Since these stencils are a single-use item no cleaning is required. This eliminates the cost it takes to clean the stencil thereby allowing for the rework technician to have a higher throughput. In addition, since the metal stencil cleaning process, which invariably leads to the deformation of the stencil. Is eliminated, a cause of poor print quality is eliminated. Since no holding posts or fixtures are required when using these Mylar stencils and fold up tabs may be integrated into the design of the stencil to eliminate the need for nearby taping, they can be used in very small spaces. The challenge of holding the stencil onto the board during the printing process is overcome via the "sticky tack" adhesive system.

Its softness allows the rework technician to slide around the stencil for fine, micro adjustments over the site to be reworked. This same adhesive insures co planarity between the stencil and the PCB, even a warped PCB site. The newly developed adhesive-backed, single-use rework stencil overcomes many of the problems users have experienced in working with metal rework stencils.

Link to http://www.solder.net/marketplace/product_desc.asp?Sku=StikNPeel&Category=122

A video of the process can be seen at: http://www.youtube.com/watch?v=7fBVgSCspgE