DESIGNERS NOTEBOOK

Nipping the wicking problem before it reaches the plant

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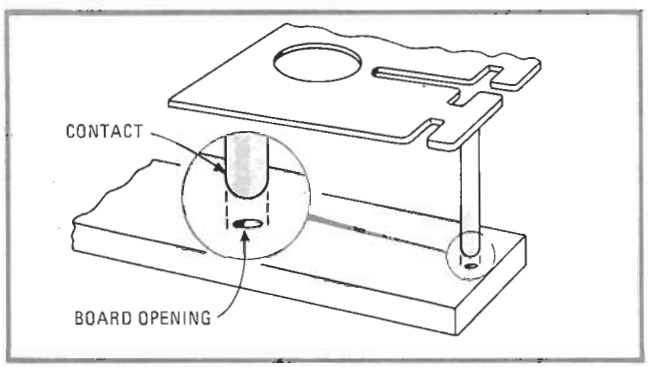
The damaging effects of solder wicking, or the travel of solder along male contact surfaces, plague electronic component manufacturers worldwide. Inevitably, the solder enters the female contact cavity of a connector, destroying its spring properties by locking the moving pieces in place. Moreover, the solder may render the female contact unpluggable, making insertion of the male contact impossible.

Manufacturers of circuit-board connectors have fought for years with designing solder stops into their circuit boards. Often the vendor of the precision-stamped male contacts can fix the problem without involving the component manufacturer. By building a solder stop right into the design of the contacts, the vendor stops the wicking problem.

One possibility is to specify a male contact whose circumference is slightly greater than the circuit-board opening into which it must fit. The tight fit precludes the passage of the solder into the female contact. It is less expensive to produce a larger male contact than to alter the design of the circuit board. Figure 1 illustrates this solder-wicking prevention method.



1. Tight squeeze. One solution to the solder wicking problem is to produce a contact whose circumference is slightly greater than the circuit-board opening into which it will be inserted. The snug fit precludes the passage of solder into the female contact.

The most economical way to prevent wicking is through a mechanical barrier built into the initial contact design. Figure 2 illustrates one obvious type of barrier where the female contact is closed off at the bottom to prevent solder entry. The procedure is accomplished as follows: Before forming the tubular contact from strip metal, the stamping vendor lances out a disk, leaving the disk attached to the strip at some point. When the contact is formed, the disk is used to close off the contact bottom. Although this disk, or solder stop, won't inwardly produce an airtight seal, it will sufficiently hinder the solder's flow. Depending on the length of the female contact, the solder that passes the disk may not reach the critical spring area.

Even though the tooling for this design may cost more initially, this differential will be amortized over the life of the part. The alternative is to risk a total failure of the connectors.

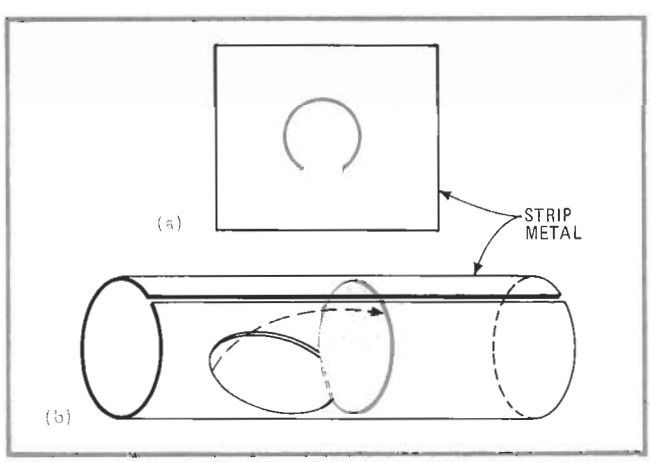
Another option to the stamping vendor is to squeeze tubular contact seams solder-tight. Where this is feasible, it will be the least expensive solution to the potentially costly problem of wicking.

If a stamping vendor cannot employ any of the above measures, a barrier can be built into the circuit board itself to curb wicking. The challenge is greater here because circuit-board openings are commonly tinned for the express purpose of making the solder adhere.

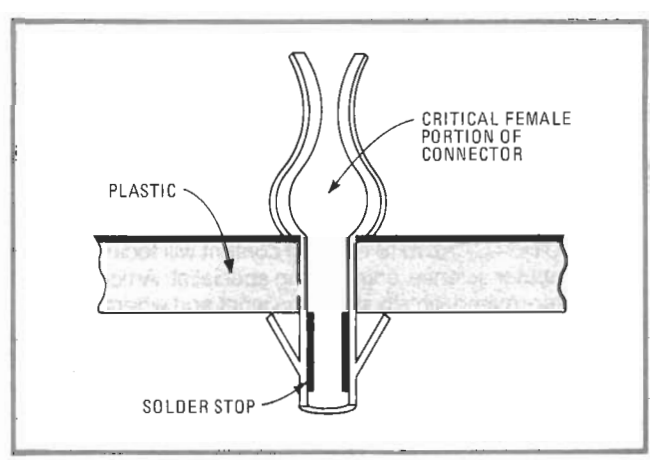
A final alternative is to use a material-deposition process of inlaying aluminum in the strip metal from which the contact will be formed. Figure 3 illustrates this concept. This material-deposition technique operates as the Teflon pan concept: Both Teflon and aluminum are nonstick surfaces.

Although a select number of precision stampers have this capability, it remains economically unfeasible for many component manufacturers.

Considering the various means of preventing wicking at the design stage can cut future assembly costs. □



2. Solder stop. One economical method of preventing destructive solder wicking is to build some sort of mechanical barrier into the initial contact design. An incomplete circle is cut from the strip metal (a) which forms a barrier when the metal is rolled into a contact (b).



3. Material deposition. Another solution to the problem is to use the material-deposition process. The tubular connector is plated inside with aluminum to prevent solder from traveling up its interior. The aluminum acts as a non-stick surface and halts the solder in its tracks.