Tips for Fine-Line Finesse

Shrinking dimensions mean a growing need for troubleshooting.

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Table 1. Fine-line processing problems and solutions.

Problem	Solutions
"White-out," high glass topography caused by glass knuckles.	* SE (surface-enhanced) glass provides lower surface profile. * Construct layers with fine-weave glass styles.
Dents, pits, oils on copper surface. Foreign material within layers.	* Communicate to your suppliers what you're trying to accomplish. Put the onus on them; make your concerns their concerns.
Scratches in copper from cleaning operation.	* Avoid brushing. Alternatives are: - Pumice - Chemical milling: Slurry of aluminum oxide, which is less destructive than pumice. - Chemically clean with sodium persulfate or cupric etch, the latter being the least expensive.
Air pockets under dry film; adhesion problems resulting from causes other than improper cleaning.	* Use a slow roller speed during lamination. * Use a warmer roller temperature (exit temperature of about 250°F). * Wet lamination—drop a water curtain onto the rollers. * Process liquid resist using a roller coater.
Opens, shorts: —Due to insufficient artwork quality.	* Put artwork in glass-pack. Artwork encased in glass housing reduces handling damage.
—Due to use of thinner dry film.	* Wet lamination combined with 1.3-mil resist gives highest yields.[1]
Poor image transfer resulting in line problems.	* Use resist with higher-clarity Mylar (less ash). * Place artwork directly onto PVA coating after removing Mylar. * Use collimated light source at about 5,000 watts.
Spurious copper (i.e., copper spots after etching) from resist redeposition in developer line.	* Use thinner dry film, which means less to remove. * Check rinse chambers; resist dragout can deposit on rollers. * Filter solution, ensuring that the filter doesn't shear the particles.
AOI problems caused by tarnished copper.	* Use corrosion inhibitor in stripping operation.

Ask 100 board fabricators to tell you their biggest fine-line processing problem and you'll find a lot of overlap in their responses. I encountered this trend when I recently canvassed a number of industry members on the topic.

Most agreed the current cutoff point for fine lines is 5 roils or less. These line widths would ordinarily cause no major processing snags, but when combined with spaces of similar proportions, all manner of problems arise.

Table 1 lists some of these complications.

Additional Concerns

The problems listed in Table 1 provide a good reference point, but some additional concerns such as cleaning, dry film, and etching should be addressed.

Copper removal during surface cleaning must be carefully monitored. A good starting point is in the 25- to-30-microinch range.

A detailed explanation of the issues surrounding thickness vs. yields can be found in the October 1992 issue of *PC FAB.* For an in-depth analysis of the etching process, refer to the February 1993 issue of this publication. [23]

Summary

Each shop will encounter unique challenges when converting to fine-line processing. One of the biggest boosts you can give your transition program is to get your vendors involved. Combining these vendors' expertise with that of your own engineering staff will increase the odds of success. FAB

References

[1]Cox, G. S. and A. Olson. "The optimum Resist Thickness." *Printed Circuit Fabrication,* Vol. 15, No. 10, October 1992, p. 25.

[2]2. Ibid, p. 24.

[3]Melonas, J. and D. Ball. "Improving Fine-Line Uniformity." *Printed Circuit Fabrication,* Vol. 16, No. 2, February 1993, p. 52.

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