Slashing Substrate Costs

It doesn't have to be a painful proposition.

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The use of double-treat copper laminate eliminates several processing steps and generates a more valuable product. Laminators purchase double-treat made with proprietary processes that chemically coat the copper foil with either zinc or a brass alloy prior to lamination. Either process gives the copper a dark matte finish, which grows darker as the panels go through the lamination process. The price and the advantages of each type of double-treat are about the same.

The initial advantage of double-treat is that it can go directly to dry-film lamination from receiving. A sticky roller for removing packaging dust and debris replaces chemical cleaning, microetching, pumice scrubbing, and all the associated rinsing and drying steps. Double-treat panels should only be picked up by their edges or corners, and gloves should be used to prevent fingerprints, which cannot be removed from double-treat.

Technical field service requires consistent product quality control. (Photo courtesy of ADI/Isola, Fremont, CA.)

Dry film adheres better to double-treat than it does to a micro-etched panel, resulting in better line definition and fewer etch-outs and shorts. Although develop-etch-strip is standard, care should be taken to ensure that the first and last steps in the process are thorough. Dry film left on a panel too long can be very difficult to remove from double-treat, but we have found that, under cool conditions, it can stay on a double-treat surface for several days with no problem.

From develop-etch-strip, double-treat panels sail right past oxide (and pink ring) processing and go directly to AOI. The fabricator's AOI system is often the go/no-go factor in double-treat processing, for boards made with this substrate do not respond to reflective technology, and only fluorescent AOI systems can handle double-treat.

The benefits of using double-treat include copper conservation. Each of the processing steps not needed with double-treat removes a little copper. After one or two microetches, pumice scrubbing and oxiding, a bare 1.25-mil copper foil can be less than 1 mil thick. This loss is not appreciated by the customer who ordered boards with 1.25-mil copper. Double-treat costs about 20970 more than standard substrate. Depending on the shop's volume, increased profits from using double-treat can reduce overall shop costs by 14 to 30%. The elimination of processing steps provides the additional benefit of appreciably reducing cycle time, allowing the double-treat shop to take on more work.

Panelization Efficiency

Costs may be substantially cut by more careful panelization. We've been in shops that stock up to 15 different panel sizes. These sizes were ordered in an effort to make more efficient use of real estate, but those

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savings and more are lost in inefficient sheet size selection, resulting in "drop, " in stocking, odd panel inventory and gathering dust. Excessive substrate stocking costs are compounded by corresponding prepreg stocking and waste costs.

Every shop faces different panelizing problems, but each shop has a lamination supplier who provides panelizing advice as part of his job.

Single-Ply Construction

Laminate made with low-profile glass is a cost-cutting product not offered by every laminator. It starts at the glass manufacturer, who weaves the cloth with thick yarns, like 7628 or 7629, enhances its surface area, and then presses the product to form a flatter cloth. The result is a very smooth glass that is still quite thick, and shows no measurable loss of mechanical strength. One ply of fluffed and flattened glass can produce a laminate that replaces a product made with three plies–typically one ply of 2133 sandwiched between two layers of smooth and expensive 1080 glass. Laser profilometer readings show that the surface smoothness of the foil is the same for each product.

Savings accrued from low-profile glass go all the way up and down the line, from prepreg to heavyweight laminate. They can amount to a very substantial reduction in raw material costs. Couple these savings with a supplier's tooling process that includes notching and vacuum cleaning the product at the point of origin, and more money is saved because of reduced labor and increased cleanliness in layup.

Conclusion

When these three cost-saving measures are fully implemented, a PCB shop can typically save enough money to pay taxes or purchase a suitably expensive gift for its laminator. FAB

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