Media Group

Preparing the BoM

SMTAI SHOW ISSUE →

PRINTED CIRCUIT DESIGN & FAB

CIRCUITS ASSEMBLY

pcdandf.com
circuitsassembly.com
October 2015

ACCURATE STENCIL PRINTING

Your Traces Are Too Big

Lean NPI

Diagnosing Ionic Contaminants

Optimizing Panel Size

Match the working area on a panel to the assembly panel size.

QUESTION: I AM working on a project that has several flexible circuits. I have had to order these a couple times during the development phase and now am ready to go to production. When ordering prototypes, my supplier also gave me budgetary prices for production quantities. I just got my production quote back and the prices are over twice what had been budgetary quoted. The only difference is that I am now having them supplied in panel form for assembly. Why would that cause such a big cost increase?

As I read the first part of the question, I figured the supplier had just dropped the ball on the budgetary quote. It is unfortunate, but it happens. But then I got to the other part about panels and realized there may be another underlying issue.

First, I should explain that virtually all rigid and flex PCBs are manufactured in panel form. Every manufacturer has a couple of standard processing panel sizes, and they are not the same among different manufacturers. The rigid or flex manufacturer will pick its standard panel sizes based on many factors, such as raw materials, internal processing equipment sizes, and ease of handling. Flex circuit manufacturers typically run smaller standard panel sizes than rigid PCB manufacturers because of the dimensional instability of raw flex materials.

Also, there's a distinction between the processing panel and the assembly panel. A processing panel is the large panel that carries the bare flex through the process required to create the bare circuit. Since most processing panels are too large to fit standard SMT equipment, they are cut into smaller assembly panels at the end of care board manufacturing. These smaller panels are the assembly panels and will carry the circuits through SMT and assembly.

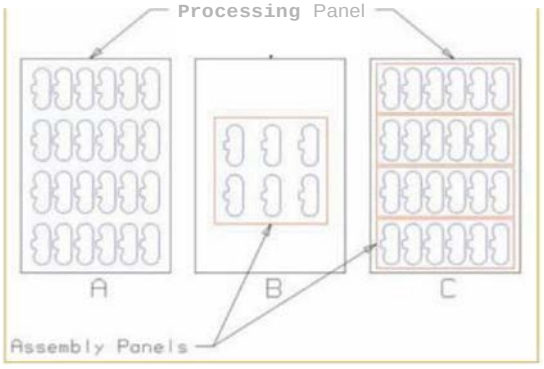

FIGURE 1. In these panelization examples, Panel A assumes no assembly panel requirements. In Panel B, the assembly panel specified would reduce panel density to six boards. Panel C is a compromise layout that maximizes board count at the lower additional cost.

When the job is set up, the manufacturer will attempt to pack as many circuits as they can on each processing panel. The processing panel will have a set cost based on the material and processing time. This processing panel cost will be the same whether there are 2 or 50 circuits on the panel. The more circuits on the processing panel, the less each circuit will cost to produce. See where I'm going with this?

The inquirer states that the only significant difference between the prototypes and production circuits was the addition of an assembly panel. Although I don't know the manufacturer's standard panel sizes, there is a good chance you picked an assembly panel size that does not fit well on the processing panels, and this has significantly impacted the number of circuits that will now fit on the processing panel. As an example, if the manufacturer uses an 18" x 24" processing panel size with a working area of approximately 16.5" x 22.5", and you specified an assembly panel size of 12" x 12", only one assembly panel will be one the much larger processing panel! The rest of the processing panel goes into the scrap bin when the single assembly panel is removed, and the cost of all that scrap is amortized into the few parts on the assembly panel. This may be an extreme example just to prove a point, but even a small reduction of processing panel density will have a significant impact on the cost of the individual circuits.

Another aspect to consider is the assembly panel density. The flex PCB supplier is going to cram as many parts as possible on the processing panel. If you have not only dictated assembly panel size, but also the circuit layout within that panel, you may have doubly jinxed yourself. FIGURE 1 illustrates this. Panel A shows how the manufacturer would like to run this PCB if there were no assembly panel requirements. Panel B shows what would happen if an assembly panel is specified that is slightly larger than have the processing panel, with a six-up array. The panel density goes from 24 parts per panel to just six! Panel C shows a compromise that would provide the parts in panel form without significant impact on cost.

My advice: find out what processing panel size the flex circuit supplier plans to use and what the working area is on that panel. Then make sure any assembly panel size you might specify will fit efficiently within the working area on the processing panel. Or better yet, tell the fabricator you want the parts supplied in panel form and specify approximately how many parts you would like on each assembly panel. If there are overall, size constraints on the SMT equipment, also share this with the supplier. Then let them propose the actual assembly panel size and circuit layout. There will probably be some back and forth to dial in the best size, shape, and circuit layout. At the end of this process you should have a pretty good understanding of how different configuration drive cost. Also, by doing this you will ensure that finished layout will be optimized for your fabricator (giving the lowest cost) and that it yields an assembly panel that will work with the SMT and assembly equipment.

MARK FINSTAD
is senior application engineer at Flexible Circuit Technologies: (Flexiblecircuit.com); mark.finstand@flexiblecircuit.com