

# The Flex Bottleneck

With high-density flex demand spiking, concern grows over adhesiveless copper laminate supplies.



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**JAPAN'S PCB PRODUCTION** stayed true to form this year, peaking in July, before the summer vacation. Volume and sales showed remarkable increases. It appears to be a normal trend, although the growth appears relatively large against the slow economy. Consumer electronics has rebounded more sharply than other industries. Flex circuits has grown eight straight months, with revenues almost matching 2000 levels. But the constructions have

changed significantly. Now, 50  $\mu\text{m}$  pitch traces are common for single-sided flex for chip-on-flex applications. And high-density rigid-flex with 50  $\mu\text{m}$  lines and spaces for new cell phones has been making major strides. Typically, Japan's August production declines. But many flex makers could not take long vacations this year. Keep an eye on August's numbers.

Flex manufacturers in Japan and Korea have encountered similar problems. New high-density flex circuits consume large volumes of adhesiveless copper laminate. Material vendors lack capacity. It's a bottleneck. Plans call for more capacity, but the supply issue won't be solved by spring. Korea has about 20 flex circuit and TAB manufacturers. I visited several in September. They have made significant progress, producing 50  $\mu\text{m}$  pitch traces for COF substrates in large volumes and high-density double-sided and multilayer rigid-flex. Technology levels are almost equivalent to those of the major Japanese manufacturers. Demand has been strong for LCDs and cell phones. However, demand greatly exceeds capacity. Most major manufacturers have aggressive plans to expand.

Over the past several months, I have been asking major high-density fabricators, including flex circuit and TAB manufacturers, about their fine-line capabilities and future plans (Figure 1). Traces of single-sided flex and TAB are smaller than 50  $\mu\text{m}$ . LCD drivers are consuming vast volumes of COF assembly. End-customers are asking for finer pitches, and fabricators are planning to develop 25 to 30  $\mu\text{m}$  traces in the next

18 or 24 months. Customers are also asking for 60  $\mu\text{m}$  pitch double-sided flex or TAB in the next two years. Multilayer manufacturers are slightly behind flex makers, but are aggressively trying to close the gap, with plans for 30 to 40  $\mu\text{m}$  L/S traces on outerlayers in the next two years. It should be noted that most of these companies are Japanese. Some are Korean, Taiwanese, and Singaporean. But the effort of North American and European manufacturers is minor, especially among the volume makers. The technical gap between Asian and other manufacturers is getting larger. North American and European fabricators should start immediately – if they want to survive.

Japanese, Korean, and Taiwanese fabricators have been moving to build-up boards and high-density boards to maintain margins. More than 75% of installed laser drills are owned by Asian companies. But while European PCB manufacturers have some, North American fabricators have made little impact. Do North American customers like high-density circuits? In the course of several interviews I conducted, fabricators said, "We are ready to go high density. But there is no demand in the U.S." The customers said, "We want to use high-density circuits to reduce product size, but there are no capable designers and no reliable manufacturers." Design houses said, "We can design. But fabricators cannot make high-density circuits and customers don't ask for them." Can companies survive solely in the traditional multilayer business? Someone should break the ties that bind.

## Notes

Unicap (Taiwan) will expand flip-chip substrate capacity to 92 million units per month by 2005. It will introduce an additive or semi-additive process for 20  $\mu\text{m}$  L/S.

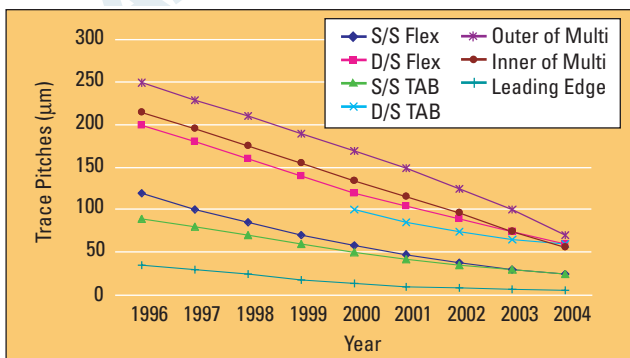
The Korean PCB industry will grow 17% to \$2 billion this year. Flex circuits, build-up boards, and IC substrates will grow more than 25%.

Nippon Polytech has developed a liquid base aqueous etching resist for ultra-fine (15  $\mu\text{m}$ ) patterns.

Matsushita Electric Industry announced "SIMPACT" (System in Module using Passive and Active Components Embedding Technology), an embedded component technology said to reduce board size by up to half.

Plating equipment maker Chuoh Seisakusho has commercialized a high-accuracy vertical copper plating system for high-density boards said to be capable of copper thickness of +/-2.5  $\mu\text{m}$ . It features continuous processing and three times the productivity of traditional batch processes. ○

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**FIGURE 1.** Forecast trends for fine-line circuits.