

JPCA Show - United We Stand

Matthew Holzmann, Christopher Associates



Expectations going into this year's edition of the JPCA Show were decidedly mixed. The near-term viability of the Japanese manufacturing infrastructure has been shrouded by a lack of information, bureaucracy and factors such as limited power output. JPCA was the first occasion for many observers to observe and report on industry conditions with a wide range of first person input.

Fear of radiation despite Tokyo's distance from Fukushima resulted in far fewer visitors from China, Taiwan, Korea and even the Kansai region south of Tokyo. Overall, attendance was estimated to be off by 20 to 30 percent. And yet the spirit shown by those attending was admirable. Everywhere one looked, booths were bedecked by signs saying "United We Stand" and "Yes, We Can." There is a spirit of cooperation and generosity that goes well beyond the Japanese traditions of teamwork and hospitality.

A part of this may be self-reliance, as the national government and companies such as TEPCO have not met expectations. The recent failed attempt to pass a vote of no confidence in the Prime Minister in the Diet, the Japanese parliament, resulted in numerous comments about the universal nature of politicians by several generally apolitical associates. Instead, there is incredible admiration for individuals such as some of the small-town mayors who have taken up responsibilities far beyond their original expectations.

And this is the difference. It is individuals and small groups that seem to be having the greatest impact. In the electronics industry, it is engineers and line managers who are figuring out how to increase output and put people back to work. The automotive industry expected the effects of the disaster to linger until the fourth

quarter, now there are hopes that business will rebound a full quarter earlier. Additionally, it is expected that there will be a strong increase in demand driven by replacement of losses from the disaster as claims are settled and the displaced are relocated. Factories coming back online also are restoring a sense of normalcy. The greatest question marks are power, agriculture and fisheries. With power restrictions in place for the summer, government officials and companies are introducing casual workdays so employees can beat the heat. The image of the Japanese salaryman may never be the same. (It also must be remembered that the disaster affected only a small region of the country. The Kansai, Kyushu and other islands were hardly directly affected.)

Expected shortages in components and materials are being mitigated by increased production at alternate sites. While ultra-thin copper foil and 12" wafer supplies are still constricted, workarounds are being found. Quarter-ounce copper can be etched down.

The JPCA Show is now approximately 70 percent printed circuit fabrication and 30 percent PCB assembly. With the lingering effects of the recession as well as a constant grinding of profit margins from China, booth sizes are smaller with less equipment exhibited on the floor. One major supplier reported that during fiscal 2010, which ended April 1, machine shipments were up 30 percent but profitability was down 20 percent.

However, these pressures only serve to accelerate innovation. The Japanese interconnect industry has taken the high road in technology. The technical program featured papers on precision thickness control for high-frequency applications, low coefficient of thermal expansion (CTE) materials, thermal management and greater implementation of optical components. One fascinating paper described the development of a vibration-driven MEMS energy harvester. Technically, JPCA offers as good a program on advanced packaging as any in the world.

The Japanese high-density interconnect (HDI) market, which did not exist in 1995, is now a \$10-12 billion industry per year, per Dr. Hayao Nakahara. In contrast, the US HDI market last year was less than \$200 million. (Total US domestic interconnect production was just north of \$2 billion.) HDI is driven by handhelds, cell phones, tablets like iPads, notebooks and all sorts of other products the Western interconnect industry wrote off years ago when RCA ceded the television market to Sony. As Taiwanese and Chinese manufacturers climb the technology ladder, the Japanese continue to raise the bar.

All sorts of special process and materials have been developed to figuratively meet the challenges of carrying 10 lb. of current in a 5 lb. bag while maintaining impedance levels below 5 ohms. Special surface finishing and roughening processes for application ranging from CO₂ drilling to adhesion promotion for photoresists, flex circuits, touch screens, Gorilla Glass, and a hundred other applications. Conductive inks resistant to high polarity solvents, LED inks, materials and processes for coefficient of thermal expansion matching, thermal management products and processes, and new formulations to reduce precious metals costs are all part of the mix.

In imaging, 50 µm lines and spaces are the norm and direct imaging systems built by a wide range of suppliers using the Texas Instruments DLP chip as the basis for UV-based systems have some PCB manufacturers pushing 15 µm lines and spaces.

The number of manufacturers offering embedded component technology (ECT) is rising rapidly. More and more companies are experimenting with active components and even developing new types of passive packages based upon ECT. One potential advantage is lower power consumption, a direct benefit in extending battery lifetimes. Another is shielding for wireless applications.

The PCB assembly side of JPCA Show saw most of the major Japanese pick-and-place manufacturers offering incremental improvements and new systems for special applications such as LED manufacturing. In assembly materials, there is a major effort to find new alloys in order to reduce materials costs. Low silver solder pastes and alternatives to SAC 305 were in evidence with several suppliers. With tin prices at all-time highs, cost increases have plagued the industry.

In a story worthy of the *New York Daily News*, the uproar about the incursion of Underwriters Labs onto the turf of the longstanding standards organizations serving the interconnect industry was overwhelming. UL, who converted into a for-profit company recently, has been pressing to become the global organization certifying printed circuit manufacturers and processes. Period. With over 60 years of history and data behind them, IPC, JPCA and the other coalitions of the stakeholders who developed the processes and wrote the standards would seem to be rightfully concerned. This must become an industry-wide conversation.

All in all, it was an exhilarating week.

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-By Matthew Holzmann, Christopher Associates

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