Green's Gains

As product stewardship – taking responsibility for a product from cradle to grave – makes its way into mainstream manufacturing, OEMs will be faced with greater oversight for ensuring that obsolete electronics avoid the landfill.

To recount July's announcements: A major office equipment retail chain and a pair of leading PC OEMs launched programs under which they would recycle old computers for free. In a joint announcement, Office Depot and H-P announced plans to take back outdated machines at no charge to consumers. Separately, Dell said it would retrieve old machines at consumers' homes, provided they purchase a new Dell PC. It costs about $20 to recycle a computer, which in part is why less than 10% of electronics are recycled, according to the Silicon Valley Toxics Coalition, an industry watchdog group.

Such thinking is making its way to the assembly level as well – and not just sheathed in mandates banishing lead from solder. Vijay Wakharkar of Intel drove the point home during a special invite-only forum on packaging trends during Semicon West. In a four-hour session at the Marriott Hotel cosponsored by SEMI's International Electronics Manufacturing Technology Symposium and Henkel Technologies, several experts spoke at length on coming challenges in packaging.

With package costs beginning to exceed even the semiconductor die, more attention will be paid to these critical interfaces between the brains – the chip – and the boards. Wakharkar called attention to particular environmental trends, saying, "I think customers will ask about chemicals in packages." In order to satisfy pending legal and regulatory requirements, material composition declaration requirements being developed and in some cases mandated by OEMs. Under these mandates, OEMs may hold their suppliers responsible for ensuring no restricted or banned materials are present in their products.

Further evidence of green's gains: lead-free solder bumps. "Some increase [in use] in the next year or so" should be expected, said Jan Vardaman of TechSearch International and a *Circuits Assembly* columnist. Fujitsu, she noted, uses lead-free bumps in all products for internal use.

Going green wasn't the only dish on the menu. Wakharkar described several other trends, including the convergence of computing and communications. The result, he says, will be packages that are more complex, with higher I/O counts, and die stacking and pinning. For example, Intel is working on stacking six to eight dice in a single package. In turn, materials suppliers will have to come up with combinations that withstand or "smooth" the heat spread from chip to package.

Furthermore, gains will continue to come in tighter densities. By next year, Wakharkar says, manufacturers can expect BGA pitches to decrease to 0.3 mm for CSPs, and to 0.6 mm for what he calls "cost-performance" packages.

Vardaman also noted a shift in packages for memory devices. Such applications are shifting to FBGA and wafer-level packaging from TSOPs, she says. Her forecasts call for the number of 200-mm wafers shipped in WLPs to grow from 750,000 wafers this year to 2.1 million next year and 4 million in 2006.

Other presentations ran the gamut from low-k devices and copper interconnects, lead-free material sets and high-speed dispensing.

"The goal was to educate attendees about the power of partnering with industry leaders and illustrate how these partnerships can yield solutions to some of the biggest challenges in semiconductor packaging," said Bhavesh Muni, business manager of semiconductor packaging materials at Henkel, in a press statement.

Muni said the turnout – 120 persons – and positive returns would lead to another symposium at Semicon West next year. We say 2005 won't come soon enough.

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