

Deep Tech

THE FUTURE BEGINS TODAY

BY RIK MYSLEWSKI



INTEL GETS THE LEAD OUT

Heavy metals can kill. (Calm down, Slayer fans, I said “metals,” plural.) These poisonous elements can cause a bone-chilling array of maladies, including high blood pressure, nerve disorders, learning disabilities, kidney failure, and—shudder—loss of libido. Not good.

Unfortunately, computers are a cauldron of heavy-metal malevolence. That’s the bad news. The good news is that this perilous situation is changing for the better.

Take, for example, your Mac’s display. Odds are that you’re surfing the Web and answering emails from unfortunate Nigerian ex-civil servants while gazing at a gorgeous LCD screen. These flat-panel beauties contain a mere 1 gram of the dangerous heavy metal, lead. Old CRT (cathode ray tube) displays, by comparison, contained between 500 and 1,500 grams of that nasty element.

Lead, however, continues to be an integral part of chip construction. Not much lead, to be sure, but with last year’s worldwide chip output being in the \$270 billion range, those little bits add up. Fast. Literally tons of lead-bearing chippies are clogging up landfills, just waiting for their chance to pollute groundwater, enter the food chain, and warp your kid’s developing mind to the point where he or she might actually *care* whether Lindsay Lohan is losing too much weight.

To counter this odious threat to global popular culture come the master metallurgists at Intel. Beginning with their next generation of microprocessors, code-named Penryn and scheduled to appear later this year, all traces of lead will vanish from Intel chips. What’s more, Intel plans to retrofit earlier chip designs beginning in 2008, with the goal of manufacturing a full line of 100 percent lead-free processors and their support chips next year.

This unleaded future is the culmination of a long-running Intel effort to free its chips from that heavy metal. [Five years ago, for example, Intel began shipping its first 100 percent lead-free flash memory chips. In 2004, the company reduced the lead in its chips by 95 percent. In the Penryn line, that last 5 percent will be banished.](#)

So why was that last 5 percent so stubborn? Because it was hiding in what’s called the *first-level interconnect*—the solder joint between the chip and the package it rests in. Lead has been a vital component of this joint for many years—so long, in fact, that the electrical and physical attributes of both that connection and the chip package were designed around lead’s properties. It was no mean feat for Intel engineers to replace that lead with a secret sauce of tin, copper, and silver that mimics lead’s properties and is both reliable and easy to apply.

But they did it. What’s more, the new first-level interconnect solder joint is even more electrically effective than the old lead one was, allowing it to carry more current and thus enable better-performing chips. Better performance and less pollution—there’s a win-win we can all get behind.

The only lead in Rik’s life will soon be that which is in his right foot when he’s driving his chili-red Mini Cooper.