PCB materials: Recycle, reuse, dispose?

Nicole Faubert - December 13, 2013

One of our readers from last month’s article ‘Make a PCB with your laser printer’ raised an interesting concern about the disposal of chemicals used to make a homemade PCB. In that particular article, we discussed making your own PCB using ferric chloride, which cannot be disposed of by simply pouring it down the drain since it is both bad for the environment as well as the copper drainpipe. It should be disposed of at a hazardous waste facility. This led me to question, in more general terms, what about the disposal of manufactured PCBs? After all, consumer demand for electronic devices is at an all time high, and each device contains one or more PCBs, therefore disposal of waste PCBs is a growing concern.

Recycling PCBs is challenging, since a PCB contains several different chemicals, metals (including precious metals such as gold, silver and copper) and glass fibers. The recycling of these materials is important from both the perspective of waste reduction as well as of recovering scarce materials.

For example, Tantalum, an extremely good conductor of heat and electricity, is one such scarce material that is commonly used in high-performance capacitors on PCBs in mobile phones and personal computers. In fact, it is thanks to Tantalum that electronic devices have become much smaller and more sophisticated than ever before. Since Tantalum is in such high-demand and difficult to substitute, recycling it from end-of-life electronics is important to its sustained use.

?According to the American Journal of Environmental Engineering, electronic waste (E-waste) is the fastest growing waste stream in the industrialized world. They estimate that 95-97% of the e-waste by weight contains metal, glass, and plastics, which can easily be disassembled and recycled by conventional recycling practices without damaging environment. However, it is the rest of the 3-5% of e-waste that consists of PCBs/connectors that need environmentally friendly recycling techniques to manage. These components are typically ground to a powder to recover metals such as tantalum, gold, silver, and copper for resale. The recycling of PCBs can actually be a profitable business. However, not surprisingly due to the high cost of labor in the US, most end-of-life electronics are exported to other countries such as India or China for recycling.

While the majority of e-waste is generated from the public and private sectors, the availability of low-priced consumer electronics means that household disposal of end-of-life electronics cannot be ignored. My household is probably an extreme example. My husband and I are both engineers, and we have a basement full of old computers that we just couldn’t bear to see disposed of because they still worked fine. We either paid a token fee for them or got them for free when the companies we worked for wanted rid of them. At the time, we thought that they would be perfect for the kids to use one day.

Now, several years later, they still sit unused in our basement collecting dust. The CPUs cannot support the high-performance games that my son likes to play, and my daughter simply cannot have one of those unsightly dinosaurs in her stylish room even though they would work just fine for
browsing the web. Reluctantly, I’ve decided that the time has come to get rid of them.

Unfortunately, I can’t even seem to give them away. I asked at my kid’s school if they needed or wanted a few albeit old but working computers, but even they kindly refused since they were not up to par with current technology. Thankfully, I found a local technology-recycling center that will take them off my hands. How about you? Are you a technology pack-rat with a home or office full of old electronics?

Also See:

- Strategies for electronic recycling: Europe leads again
- The heart of responsible e-waste recycling
- Joint venture for metals recovery from waste circuit boards