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## Connecting Ethics to Engineering through Conflict Minerals

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Where we get materials to make things doesn't often come up in conversation. It is even more unlikely that it comes up in the context of ethics. I was surprised, therefore, in April of 2008 when I heard filmmaker Lisa Jackson in a radio interview discussing her documentary about the conflict in the Democratic Republic of Congo, where minerals and mining are closely connected with unspeakable war crimes.

I teach in the materials science and engineering program. I am intrigued by topics such as the distribution of the elements in the earth's crust and the ways that engineers can take them apart and rearrange them to make fascinating and useful devices. For many years, I have used the example of tantalum capacitors in classes. They are truly marvels of materials engineering, and they have tremendous practical import. They are a key enabling technology in cell phones, laptop computers, implantable medical devices, and low-noise amplifiers. Furthermore, they are exceptionally reliable. But I had been thinking of them only in terms of the good they do for humanity. The idea of worrying about the ethical implications of them was something I had not had occasion to confront.

I am not new to thinking about the ethical implications of engineering decisions. I've developed courses on using engineering solutions to meet people's needs, and on strategic metals and materials in the twenty-first century. I have been a part of the Case Western Reserve University (CWRU) chapter of Engineers without Borders, and have attended events from the CWRU STAND chapter, which is an antigenocide group. This latter group and I discussed the role of conflict minerals, women as a casualty of war, and possible student action.

The relative role of universities, government, and business was sometimes part of our discussion. It was interesting to review the flow of materials in the context of microelectronics. An overview from a trade magazine made us aware that, in the particular case of tantalum and tantalum capacitors, there are

a small number of companies that dominate each stage of tantalum conversion from ore to capacitors. This meant that decisions of a single company, or small number of companies, could make a big difference in the behavior of the entire industry. We noted with interest that the major tantalum mining firm in Australia (Talison, later to become Global Advanced Metals) suspended operations for three years. One effect of this was to force the issue of the ethics of mining to the surface.

When it comes to companies that manufacture capacitors, a small number dominate the industry. One of the most inventive and successful is AVX, a Kyocera Group Company. Kyocera, of course, was cofounded and developed into a global presence by Kazuo Inamori, who endowed the Inamori Center for Ethics and Excellence at Case Western Reserve University. The question came up in my discussion with some of our students as to whether this might be an opportunity for companies to provide leadership—this would prove to be the case.

In the meantime, Senator Sam Brownback (R-KS) introduced a bill on conflict minerals (U.S. Senate Bill 819) in April 2009 that would have required electronics companies to verify and disclose their sources of cassiterite, wolframite, and tantalum. This legislation died in committee. However, Brownback added similar language as Section 1502 of the Dodd–Frank Wall Street Reform and Consumer Protection Act, which passed Congress and was signed into law by President Barack Obama on July 21, 2010. Thus, I had the opportunity to discuss the role of policy decisions with the students. In this specific case, the availability of a raw material for technology was constrained by a policy decision that was motivated by humanitarian reasons.

The question then became how the industry would deal with the new requirement. A variety of approaches became evident in the trade literature. The Australian mines did reopen. But the trade literature continues to note that Australian supply is less than what is needed to meet global demand. Other sources, such as Brazilian mines, have been increasingly pursued, and there are reports of the entire annual production being bought up, in some instances by a single company.

But, ethics questions are never simple. While extraction of mineral resources in the eastern DRC was known to be an unhealthy system because of its support for horrific civil strife, the absence of mining would doom the region to crushing poverty. The statement “the only thing worse than mining coltan would be not mining it” has been used for years to point to this fact. The existence of the conflict minerals clause in the Dodd–Frank act, however, raised the stakes of a decision to keep commercial operations in that region.

It is hard to know how corporate decisions are made. It is hard to know what factors have to be weighed. It is hard to know what information has to be gathered and what costs have to be borne when different scenarios are considered. But we can see the consequences of decisions in the trade literature.

In December of 2011 AVX announced the “Solutions for Hope Project,” which was established to “deliver conflict-free tantalum material from the Democratic Republic of the Congo (DRC) under the Organization for Economic Cooperation and Development (OECD) guidelines. The process basis is a ‘closed pipe’ principle in which tantalite ore mined from a single site within the Katanga Province of the DRC is traced along its secure closed supply chain to the end customer’s equipment in the form of tantalum capacitors supplied by AVX” (AVX Press release, March 26, 2012).

By working with the DRC regional government in new ways and with strict auditing, the goal of conflict-free mining appears to be achievable without an unintentional “de facto embargo” that would disenfranchise the small, artisanal miners and communities who rely on this work to support them and their families.

In April of this year AVX was able to announce the shipment of the “first tantalum products manufactured from validated conflict-free tantalite ore mined in the Democratic Republic of the Congo (DRC) to Motorola Solutions, a leading provider of mission-critical communication solutions and services for enterprise and government customers . . . demonstrate[ing] a process for delivering conflict-free tantalum material . . . [through] an AVX-controlled and -funded ‘closed pipe’ in which tantalite ore, mined from government-approved concessions within the Katanga Province of the DRC, is traced along its secure closed supply chain to the end customer’s equipment in the form of tantalum capacitors” (AVX Press release, March 26, 2012).

Thus, this teachable moment in materials science became extended to the relative role of consciousness-raising, governmental policy (and how it does indeed make for strange bedfellows), and how business, in fact, can be a leading agent for world benefit. Even more exciting for me personally, this story provides continuity between the philanthropy that created the Inamori Center and the ongoing commercial operations of the associated international conglomerate with the corporate motto of “respect the divine and love people: preserve the spirit to work fairly and honorably, respecting people, our work, our company and our global community.”