

Anti-Recycling Devices

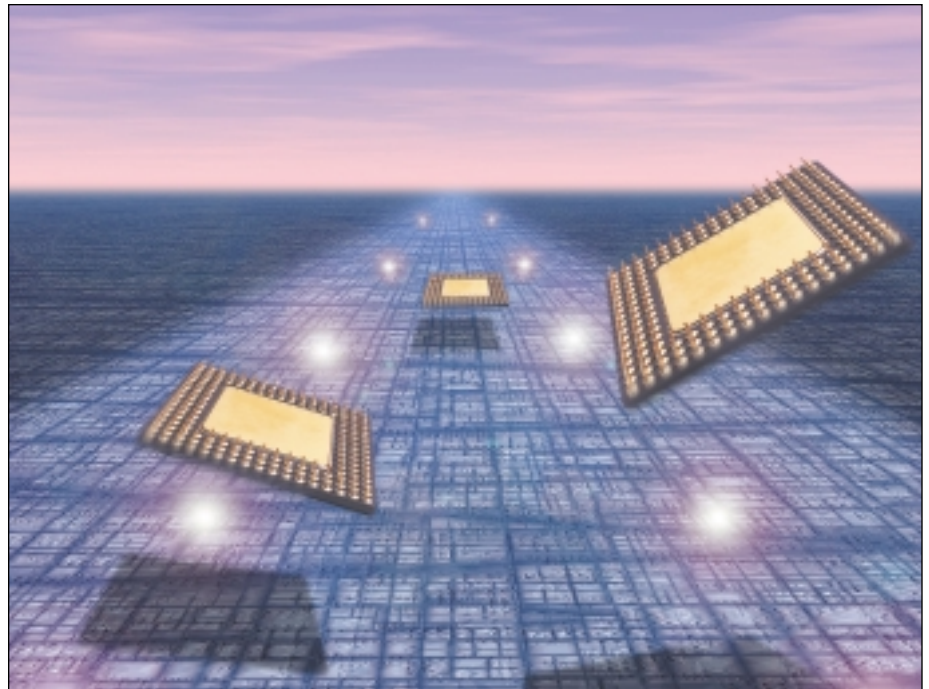
Understanding Technologies that Threaten Remanufacturing

The success of printer cartridge remanufacturing has caused some OEM companies to ignore environmental concerns and directly attack remanufacturing with insidious cartridge designs. It is foolish to think that the OEMs would make remanufacturing easy for their competitors, but some have crossed the line between fair competition and disproportionate response. The perfect example is the Lexmark patent describing an ink jet cartridge that destroys itself when it reaches a low ink level.

Manufacturers use computer chips designed for security purposes to get around laws designed to promote open competition. These chips can shut down printers and use FUD — Fear, Uncertainty, and Doubt — to discourage end users from using alternative products. At the lower end of the anti-recycling scale are the chip designs that create a loss of features placing remanufactured cartridges in the second-class category. The OEMs are not obligated to aid remanufacturing, but they are obligated to follow the laws concerning fair competition.

This article discusses the implications of anti-remanufacturing devices and explains the difficulties faced by remanufacturers.

The most positive statement I have read in defense of unfettered remanufacturing was from California Governor Gray Davis. In a letter to the Recycled Products Trade Show two years ago, he stated, “Reuse, Remanufacturing, and Recycling is Everybody’s Responsibility and Everybody’s Opportunity.” That should be the battle cry for remanufac-



turers who want to defend their right to compete. I quote the phrase to the various groups of people I meet. It makes perfect sense for the environment and for an open marketplace.

Anti-Recycling Devices, ARDs, can be physical components or even marketing programs. Some counter all recycling principles and others may not be legal. The majority of the ARDs fall in a gray area in that they simply make it more difficult to remanufacture printer cartridges, intentionally or not.

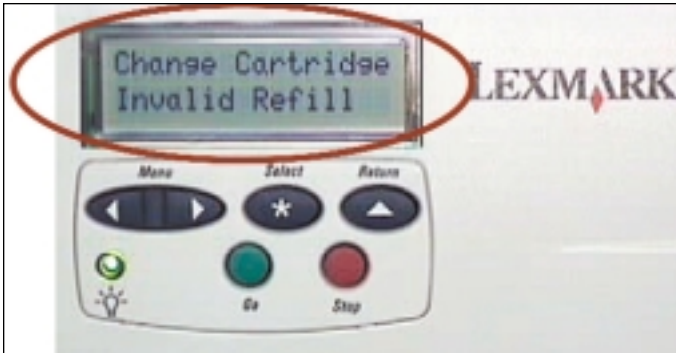
I find that ARDs for printer cartridges fall into six general categories:

- Computer chips used to prevent reuse and remanufacturing.
- Destructive disassembly.
- Time lapse destruction.
- Missing features.

- Inseparable assembly.
- Marketing programs based on disinformation.

Melt-Down Recycling

Simply put, meltdown recycling, in which a product is reduced to a raw material, is not the best for the environment and is met with resistance by many companies. It is usually not cost-effective, except in the case of aluminum cans and other metal products. Plastics provide the perfect case against meltdown recycling. Bottles are recycled and millions of pounds of plastics are melted down for reuse. However, it is cheaper to make new plastic than to recycle it. Recycled plastics are usually inferior and can only be used in low-end, simple products – like cup holders or park benches.



When Lexmark's Optra Se laser printer PREBATE cartridge runs out of toner and is remanufactured, the computer monitor and printer display the message "Change Cartridge - Invalid Refill." The printer locks up and will not print until a new Lexmark cartridge is installed. A smart electronic chip on the cartridge is programmed to make this happen.

Recycled plastics are physically different and they have less predictable characteristics than new plastics because they go through additional heat that degrades them. Purity of the recycled plastics is a big problem. The impurities are the result of sorting efficiency of the used plastics and removal of contaminants like coloring agents, labels and glues.

As a result, there is a tremendous worldwide stockpile of unwanted recycled plastic. That is the dirty little secret about meltdown recycling. I am not implying that the world should not use meltdown recycling because it does reduce the physical space for plastic waste. But other practices that offer greater benefits to the environment and to business should be considered first.

Reuse

Reuse of something usually takes the least amount of energy to continue the life of a product. Companies that reuse printer cartridges are those that simply reuse all of the components in the cartridge and replace the toner. Reused products are not as reliable and generally do not perform like new or remanufactured products. Reuse carries the connotation of lower quality than a new product. As a rule, this is true.

Remanufactured Products

Remanufactured products represent the highest form of recycling because the products are disassembled, inspected and reassembled with new or refurbished parts to obtain like-new performance. They also are cost-effective. Quality remanufactured products are a threat to new product market share. The success of remanufactured laser printer cartridges, with a 25 to 30 percent market share, is the perfect example of just how threatening remanufacturing can be for new products.

This threat, even though printer cartridge remanufacturing

market share has not increased in three years, has caused an incredible reaction at the OEM level from some companies. This also is a sign of the economy's increasing pressure on the OEMs. I believe remanufacturing of printer cartridges has reached equilibrium with OEM new cartridges. Only a significant change in the market dynamics will shift this balance. This is exactly what the OEMs are attempting to accomplish – a change in the market dynamics.

Eliminating Competition

Today, OEMs are designing out remanufacturing in various ways. The misuse of computer chips by Lexmark International is the most blatant attack on remanufacturing. These chips are designed for security. They are inexpensive in high volume, and they can do a variety of things to improve cartridge technology. These improvements, however, mask the real purpose of preventing competition.

The Lexmark chips sense the toner level and when the level is increased the printer is turned off and "Change Cartridge, Invalid Refill" appears in the printer's display and on the computer screen.

The manufacturer's advertising for these chips explains how to get around the laws for fair competition. The chips started out as security technology for phone cards. Two of the bigger manufacturers for these computer chips are ST Microelectronics and Dallas Semiconductor. Dallas Semiconductor, the supplier of the chips for the Lexmark Optra T cartridges, says in its literature for the DS 2432 chip, "Applications of the DS 2432 include intellectual property security, aftermarket management of consumables, and tamper-proof data carriers."

Keeping in mind the above quote from the chip literature from Dallas Semiconductor, here is a quote from a Dallas Semiconductor spokesman who claims innocence. "We make the chip itself," stated Dennis Jarrett, iButton product manager, "Lexmark's Chip: So Much for Due Process" (April 1999, Recharger Magazine). "We don't know the implications of use afterwards by companies that buy the technology." Jarrett made the analogy that Dallas was merely a screw manufacturer that would not be liable in the event that a third party "uses the screw to screw you to the wall."

Well, I do blame a company that encourages anti-competitive practices in its chip marketing. It is pretty obvious that Dallas Semiconductor's idea of market management is to lock out competition.

Here are some quotes from the application notes titled "EEPROM-based Application Specific Memories" (AN 1120), available by searching the ST Microelectronics website for ASM (www.eu.st.com/stonline/bin/fts.exe):

Embedding ASMs in Objects

Often, the reason is to enhance functionality of the

object or to provide protection against cloning, misuse, or similar undesirable activities.

Smart Consumables

One of the most interesting classes of ASM applications involves embedding non-volatile memories in replacement parts or consumables. The motivation for doing this could be:

For technical reasons, to ensure that only replacement parts meeting particular specifications are accepted by the equipment. For example, in an inkjet printer, the use of inks that do not exactly match the physical and chemical properties for which the head was designed, may cause physical damage to the print head.

Or for commercial reasons. For example, if an equipment manufacturer can be sure of being the sole supplier of the equipment's consumables, it would have the option of shifting some of its profit margin to the consumables, thereby reducing the purchase price to give it a competitive marketing edge.

The use of security chips by Lexmark has indeed ensured that they are the “sole supplier” for their cartridges. ST also claims that copyright and trademark laws can be used to “protect” the information on the chip, and this is used to prevent cloned chips. The idea is to cause the chip to generate an OEM trademark on the computer monitor. Then, if you manage to use the cartridge with their logo, you are guilty of trademark infringement.

I am not an attorney, and I am not offering legal advice. However, the trademark part of that argument does not strike me as persuasive. You can rebuild a Ford Taurus and resell it, and you do not have to remove the Ford trademark emblem on the car. The OEMs are intentionally generating trademarks when they know that 30 percent of the cartridges will be remanufactured. It is disingenuous to pretend that there is trademark abuse when a cartridge is properly labeled.

The chip manufacturers have found novel uses for trademarks and copyrights. ST Microelectronics literature states:

By embedding a low-cost ASM in the replacement part, the equipment can be made to identify and authenticate the part, to determine whether or not it is officially approved and to take appropriate action. One of the major advantages of this approach is that information stored in a memory chip is subject to the same copyright and trademark laws as information published on paper, or in other ways. This means that while there may be no legal impediment to producing clone parts that are electrically and mechanically compatible with the official parts, the clone manufacturer will not be able

to duplicate the entire contents of the ASM without breaking laws that protect intellectual property.

In other words, according to ST Microelectronics, its chips can't be cloned.

End of Life Destruction

The most blatant anti-recycling design I have seen so far also comes from Lexmark. It is described in a patent, US 6,099,101, titled, “Disabling refill and reuse of in inkjet print head.” Here are some quotes from the patent:

The invention described in the specification relates to an apparatus and method for disabling an inkjet head cartridge so that the disposable cartridge can not be refilled and used again. The method involves placing a monitoring and disabling device inside of the inkjet head cartridge.... The apparatus consists of a set of electrically charged capacitors, a small processor, ink sensors, and an extra long life miniature battery....Once the processor determines that a specific inkwell has been empty for a certain period of time, the capacitors are discharged to the section of the nozzle plate corresponding to the expended inkwell. **The capacitors discharge with a strong enough current and for a long enough time to render the nozzles permanently inactive.**

What is this patent saying? Lexmark has a patent on an inkjet cartridge design that will fry its nozzles when the ink runs out, turning the cartridge into useless junk. This diabolical design is from the same company that claims Prebate is an environmentally friendly program. It is this kind of thinking that needs to be made public. Lexmark is determined to prevent competition, instead of engaging in it. Its methods for doing this also hurt the environment and prevent “everyone's opportunity” for remanufacturing.

Inseparable Assembly

Inseparable assembly is an engineering concept that is correctly applied when access to sensitive components must be restricted. However, it can also be used for other reasons. The clever thing about inseparable assembly is that some of the methods to create an inseparable assembly are inexpensive. The HP 9000 cartridge, is welded shut, the first HP cartridge design like this. The really unique thing about the weld is that it is not a straight weld. It follows a zigzag pattern that makes cutting through the weld that much more difficult. I believe that this welding pattern is intentional to make remanufacturing that much more difficult.

Diminished Cartridge Features

HP has also used chips in new ways. HP's chips are overtly arresting remanufacturing as Lexmark's technology does, but the HP 4100 chip results in a loss of important features. This

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chip is one of the most sophisticated chips used in printer cartridges yet. To get a sense of how this chip is used, other than for its excellent features simply requires a look at the supplies status page from the HP 4100 printer when the chip is removed. As originally reported by Summit Laser's Mike Josiah in the August issue of Recharger, the supplies status page states:

ATTENTION A non-Hewlett Packard toner cartridge has been detected. Remember HP Laserjet Cartridges and supplies are designed to go together with your Laserjet printer to deliver optimum print quality and performance.

The printer will be unable to report an estimate of the number of pages remaining with this non-Hewlett Packard cartridge. The toner level reported will only be approximate. [Without the chip, the cartridge uses toner at a horrendous rate, greatly reducing yield].

Service or repairs required as a result of using a non-Hewlett Packard toner cartridge will NOT be covered under the printer warranty.

Fear, uncertainty, and doubt – the watch-words for using a remanufactured cartridge. Fear of losing the warranty on the printer, fear that the non-HP cartridge will cause damage to the printer, uncertainty about the toner level, and doubt that you made the right decision.

Disinformation

The most aggressive disinformation programs are used in Asia. HP takes on a very aggressive stance in regard to remanufacturing. The model for disinformation in a marketing program is clearly Lexmark's Prebate program. The Prebate program is only important to Lexmark as flimsy justification for employing chips that turn off the printer. Prebate purports to be an upfront rebate for the used cartridge.

In reality, the Prebate program is just another tool to prevent remanufacturing. Lexmark threatened companies that remanufactured Prebate Optra S cartridges to cease doing so with expensive lawsuits. Today, chips that turn off the printer when a remanufactured cartridge is used enforce the program.

I suspect that the future holds more loss of features and lockout systems to restrict or prevent remanufacturing. The public is at risk with the improper use of computer chips in that remanufacturing can be seriously inhibited when multi-billion dollar companies back them up. We must bring this issue into the public's view. There must be a public debate and an airing of the cost and environmental abuse that is taking place, most daringly, by Lexmark. This is just the beginning of it. **B**

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