

2014 U.S. Supplies Recycling Study

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Executive Summary

This study investigated the supplies and collection programs of 9 remanufacturers (remans), and 4 brokers in the United States.

The study found that remanufacturers and brokers seek new ways to collect cartridges more efficiently—not only because empties are the lifeblood of their businesses, but also because they want to be viewed as environmentally responsible. While virgin empties are preferred, remanufacturers believe that users continue to throw them away in volumes. Chinese remanufacturers have put an additional strain on the empty availability due to compliance with the First Sale Doctrine.

First Sale Doctrine/Patent Exhaustion: According to U.S. case law, stemming from the Jazz Photo Supreme Court case, a product that is originally sold in the U.S. has had its patents exhausted. This means that the customer is free to use or dispose of the product as the customer wishes without worry that the patent holder will exert patent claims on the use of the product. For toner and inkjet cartridges this means that the customer is free to give or sell the empty cartridge to the remans and they are free to remanufacture them under the “Right of Repair”. In the Repeat-O-Type case the court agreed with Repeat-O-Type that remanufacturing/refilling is covered under “Right of Repair” under the law.

However, if a toner or ink cartridge was originally sold and used by a customer in a country other than the U.S., the patents are not “exhausted” in the U.S. In that case, if that cartridge is remanufactured and sold into the U.S., the cartridge can violate patent rights.

It is legal to collect cartridges used in the U.S. and remanufacture them overseas and then ship them back to the U.S. for sale and use. However, those remanufacturers are particularly challenged to be able to demonstrate that cartridges sold back into the U.S. was originally sold and used by the customer in the U.S.

This situation is being used effectively by printer cartridge OEM suppliers to enforce their patent rights. In order to be legal, when challenged, remanufacturers must be able to show that the reman cartridges they sell for use in the U.S. were made from original OEM cartridges that were first used in the U.S.

The aftermarket industry as a whole largely focuses on the cartridge reseller channels and their own customers as the most reliable source of collections. These resellers typically sell both OEM and reman cartridges and include, Wholesalers/distributors who sell to the channels, such as contract stationers, computer supply dealers, office supply superstores, are also sources of collection. Cartridge collection, post collection and cartridge end-of-life are important for all respondents in this study, and the degree of effectiveness in each area varied widely. The collection and recycling issue is a topic of interest for all parties involved.

Remanufacturers and Brokers

Most of the large remanufacturers have captive brokers (some home-grown, some acquired) and many remans have developed their own collection programs long ago. They get the balance of their needs from independent brokers. Reman self-collections have grown which created a surplus of some models and shortages of other. This led to more transactions with other brokers until the reman self-collection became a full-fledged broker selling and buying in the market. Remans with their own brokers rely on these captive brokers for 90% - 99% of their empties. Often, smaller remans purchase about 40% of their cartridges from outside brokers. Large remanufacturers do use independent brokers in addition to their own capabilities but these transactions tend to be more to balance their own supply and demand.

Empties and End-of-Life

Supply of virgin empty toner cartridges is viewed as tight, therefore, remans also need to remanufacture non-virgin cores. Collections tends to be focused on certain models as opposed to all models. Remans try to collect just what they need otherwise their costs will go up significantly. They tend to turn selectively to their customers for empties so they can focus on cartridge models that are in demand, and because they will not remanufacture a cartridge from different remanufacturer who has different processes and parts, though they will remanufacture their own cartridges again.

While U.S. remans say they do not wish to landfill their remanufacturing and cartridge waste, this is sometimes the only cost-effective option for them. Remans, even the largest remans, could recollect many more of their own cartridges than they currently do. The primary collections channel for empties is their own sales channel (contract stationers, superstores, computer supplies dealers, etc...). The best way for a remanufacturer to get their cartridges back is from their customer base, and through their sales channels, but because remans prefer virgin cartridges, they don't collect the non-virgin cores except when specific virgins models are in short supply, and only non-virgin empties are available. Their lack of collection efforts for their own product are a weakness in the remans overall green message. Remans promote their reuse of used OEM cartridges and their recycling efforts, but they don't want to collect their own cartridges and manage their end-of-life. When a reman collects a virgin empty, they take ownership of that empty. InfoTrends believes that remans have a responsibility to have an end-of-life solution available for their non-virgin, already remanufactured cartridges. All OEMs have an end-of-life program for their cartridges and we believe that remanufacturers should also offer a program, but we don't see that action bearing out in the market.

The overall share of remanufactured cartridges ending up in the landfill remains quite high because the large majority are never recollected. Remans strong preference for virgin empties drives their collection program to increase the supply of virgin cores. In the end, 89% of toner and 90% of inkjet cartridges ultimately end up in landfill. These estimates are the sum of what the user landfills and what the reman landfills (see the table below). This has been declining over the years and the main reason for this has been that when some remans recollect a remanufactured cartridge they have instituted recycling capability to avoid having to landfill cartridges. However, the overall share of remanufactured cartridges still ending up in landfill remains quite high because the large majority are never recollected. The non-virgins that are collected have a lower likelihood of being successfully remanufactured. They are also said to be more expensive to remanufacture because they require more replacement parts, different testing, quality control and often dedicated lines. Increased cost to remanufacture non-virgins make it especially hard for remans to compete with the clone cartridges on the market.

	Toner	Ink
User Landfills	78%	85%
Reman collects & landfills	11%	5%
Total cartridges to landfill	89%	90%
Reman collects & recycles or send to waste-to-energy	11%	10%
Total	100%	100%

There is increased pressure on businesses that are running cartridge collection schemes to maintain environmentally responsible collection. No matter where a company sits in the industry, collections are expensive and difficult to run. Some players in the industry (particularly the smaller ones that might struggle to achieve the standard required) may decide not to commit their resources, rather they will seek more assistance from brokers for empties.

The environment was a hot topic in the hardware and supplies industry during the early and mid-1990s. Environmental awareness was primarily used as a marketing tool and, as such, it complemented cartridge remanufacturing and refilling. The environmental landscape has changed since that time, however. The recession made cost much more important and other issues slipped in importance. Nevertheless, many customers, particularly the larger ones, expect that their suppliers will have an environmental program in place and ultimately that includes a plan for cartridges. With that, nearly all OEMs have programs for take-back and recycling of their cartridges, and changes to those programs have been incremental over the last two years. Remanufacturers, on the other hand, appear to believe that they must report that they have a zero landfill policy for cartridges that they collect. They have driven down the rate that the industry uses landfill as a mean of disposal of waste cartridges and parts. What is largely not addressed by all remanufacturers is what happens to the majority of their remanufactured cartridges that they do not attempt to collect at end of life. Remans promote their reuse of used OEM cartridges as recycling efforts, but they don't address the issues of what happens to their own cartridges at end-of-life.

Key Findings

- 78% of toner and 85% of ink cartridges are remanufactured only one time, which means that 22% of toner and 15% of ink cartridges are remanufactured more than once. To successfully remanufacture one cartridge, remans need to collect 1.1 virgin toner cartridges and 1.2 virgin inkjet cartridges. Although they are not as desirable, remans often collect non-virgins, and this changes the metrics. Some non-virgin collections are damaged or have a number of foreign components, making them less reliable for remanufacturing. We estimate that 1.35 non-virgin cartridges are required to remanufacture one toner cartridge. For inkjet, only 15% of remanufactured cartridges are from non-virgin cartridges, so 1.43 non-virgin cartridges are required to remanufacture one toner cartridge.
- 89% of toner and 90% of ink cartridges sold by remanufacturers will ultimately be thrown away because most remans fail to collect their own product because they prefer to work with virgin cartridges. Most remanufacturers still do not want their own cartridges back but in situations where virgin empties are in short supply for specific models they will recollect their own cartridges for remanufacturing again.
- 23% of toner and 35% of ink cartridges collected by remanufacturers are unusable. Of these
 - 50% of toner and 30% of the ink cartridges and replacement parts go to landfill.
 - 35% of toner cartridges and 50% of ink cartridges/parts are recycled into new products or raw materials.
 - 15% of toner and 20% of ink cartridges/parts go to waste to energy.
 - For inkjet, 20% of the cartridges that remans collect are cartridges from the wrong vendor. That number was significantly higher in the past when empty ink tanks had little value. But with recent court actions and fear in the channel for selling new compatibles, there has been growing need to supply remanufactured ink tanks. So, empty tanks for almost all brands now have a use where in the past they did not. Remans now desire virgin empty tanks for HP, Canon, and Epson.
 - Despite the remans effort, they are bound to collect some products that they do not want. In terms of laser products, they receive toner kits, bottles, and cartridges that for multiple reasons may not be remanufactured. Aside from damage, a cartridge may not be remanufactured if there are newly made compatibles on the market for which a reman is too costly to compete in large volumes. Some of those cartridges may ultimately be sold but some may not. Most toner kit type cartridges still are not remanufactured though that is changing.
 - For inkjet, they receive a lot of cartridges that are damaged or dried out and consequently cannot be remanufactured or refilled with any confidence in quality. Non-virgin integrated inkjet cartridges have a very high failure rate for non-virgins, in excess of 30%, due to damage and dry out issues.
- Large remanufacturers are more likely to remanufacture their own cartridges more than once for those models where virgin cores are in short supply.
- Remanufacturing a cartridge more than once is more expensive than using a virgin cartridge because more parts need replaced, quality control procedures differ, and they usually need a separate production line.
- Toner parts replaced most often include the drum, charge roller, wiper blade, and magnetic sleeve. For inkjet, the sponge is sometimes replaced. Smaller remanufacturers rarely replace more than the drum and often allow the replacement drum to run several cycles. As a result, the smaller remanufacturers are somewhat more

focused on virgin hulks than are the large remanufacturers as they are less positioned to have separate processes for non-virgins.

- Empties from brokers are certified and ready to be remanufactured while the remanufacturer collection programs require more sorting
- Independent brokers are increasingly serving Chinese remanufacturers because domestic remanufacturers increasingly depend on their own collections for empties and the Chinese have recognized that they must be able to comply with the First Sale Doctrine for reman cartridges sold into the U.S.
- Remanufacturers with their own brokers rely on captive brokers for 90%-99% of their empties.

Glossary

- **Broker:** A company that buys and sells empty cartridges.
 - A captive broker is owned by a remanufacturer. They are a profit center to the parent company and will supply primarily to the parent company as well as the aftermarket when excess empties are on hand.
 - Independent brokers are an independent business and serve the reman industry overall.
- **Clone:** (Also referred to as new built, newly manufactured, or compatible cartridge) A replacement cartridge that does not use an empty cartridge from an OEM, but rather uses a newly moulded cartridge shell.
- **Empty:** A used cartridge that might be suitable for re-use or recycling.
- **Extra - Wrong Vendor:** Cartridges from vendors that the remanufacturers do not accept.
- **Final Disposition:** What happens to a cartridge at the end of its life (sent to landfill, recycled, etc.)
- **First Sale Doctrine/Patent Exhaustion:** A U.S. legal doctrine that limits the extent to which patent holders can control a patented product after an authorized sale. Once an authorized sale of a patented product occurs, the patent holder's exclusive rights to control the use and sale of that product is exhausted and the purchaser is free to use or resell that product without further restraint from patent law.
- **Hulk:** An empty cartridge of any kind.
- **Landfill:** Use of municipal waste. Municipal solid waste is commonly known as trash or garbage (US), refuse or rubbish (UK) is a waste type consisting of everyday items that are discarded by the public.
- **Non-Virgin Empty:** An empty cartridge that has previously been remanufactured
 - Bad Non-Virgin Empty: A non-virgin empty that cannot be successfully remanufactured or one for which there is no market.
 - Good non-Virgin Empty: A non-virgin empty that can successfully be remanufactured.
- **Recycling:** Crushing or melting components for use in other products or industries.
- **Reman:** Remanufactured cartridge or remanufacturer, depending on context.
- **Reman Recycling Ratio:** Share of reman waste that is recycled rather than sent to a landfill or incinerator.
- **Remanufacturing:** The practice of cleaning, servicing, refilling, and re-using cartridges.
- **Virgin Empty:** An empty cartridge that has not been remanufactured
 - Bad Virgin Empty: A virgin empty that cannot be remanufactured or one for which there is no market.
 - Good Virgin Empty: A virgin empty that can successfully be remanufactured.

About InfoTrends

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