

# 2014 Western Europe Supplies Recycling Study

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## Executive Summary

This study investigated the supplies and collection programs of 8 remanufacturers (remans), and 4 brokers in Western Europe.

Remanufacturers and brokers continue to 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. Increasingly, users, and particularly medium and large businesses and Government organisations, have the expectation that all their cartridges will be taken back which means that remans are getting more of their own remanufactured empties back. As a result, more remans will place these non-virgin empties back into their remanufacturing process. Remans also report difficulty in getting virgin empties back due in part to increased use of OEM collection programmes and due to the demand for empties now coming from China (*Although not so significant a problem was reported in Europe as in the U.S.*). Cartridge collection, post collection and cartridge end-of-life are important for all that were interviewed in this study; however, the degree of effectiveness in each area varied widely.

## Glossary

- **Broker:** A company that buys and sells empty cartridges.
  - A captive brokers 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.

## Remanufacturers and Brokers

Most of the large remanufacturers have captive brokers (some home-grown, some acquired). Most remans developed their own collection programs long ago, and supplies from brokers often met the balance of their needs. Reman self-collection grew and had excess collected cartridges. This led to more transactions until the organisation became a full-fledged broker with its own collection programs and hierarchy of selling and buying in the market. Remans with their own brokers rely on these captive brokers for 90% - 99% of their empties. By 2013 most of the large remanufacturers in Europe have acquired brokers, if they don't already have their own captive collection. Often, smaller remans, however, still purchase in excess of 30% of their cartridges from outside brokers.

Nearly all remans have some form of self-collection capability. Only a few, and usually smaller remans, source exclusively from brokers. Purchasing cartridges from brokers is generally more expensive than collecting their own empties. One advantage of dealing with brokers is that the empties from brokers are certified and ready to be remanufactured while the reman collection programs require a fair bit of sorting before the cartridges can be used. In addition, buying from brokers provides the remans with exactly what they need while reman collection programs will usually net cartridges they do not need or want, forcing them to either sell or dispose of them at additional cost. As a result some remanufacturer/collectors explained that they are trying to become more targeted with their collection programmes.

## Empties and End-of-Life

Because the supply of virgin empty toner cartridges is viewed as tight, 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 those empties so they can focus on the 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.

With the pressure to take back cartridges there is a slight shift to increase remanufacturing of non-virgin. This is coupled with the OEM collections and Chinese companies looking to source European empties. This may have to do with the First Sale Doctrine. While the First Sale Doctrine primarily impacts the U.S. market at this time, there are secondary impacts in Europe. First, we understand that the first sale is a component of some European countries and there may be a desire to hedge against future pressures to comply with local first sale doctrine/patent exhaustion issues. But more likely after the U.S., W. Europe is the largest consumer of cartridges and Chinese remans are already sourcing empties from the U.S. in order to satisfy the U.S. demand. Therefore, U.S. empties are needed for U.S. sales and so Europe is the next largest market to collect virgin empties. The First Sale Doctrine is described below.

**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 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, 83% of remanufactured laser and 87% of remanufactured 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). It is expected that landfill will start to radically decline as alternative disposal methods such as incineration/waste to energy and recycling for reuse is further encouraged and incentivized by the EU and national governments. The percent of remanufactured cartridges that end up in landfill has been slowly declining over the years. The main reason for the decline has been that when 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 because remans strongly prefer virgin empties and gear their collection programs to increase their supply of these cores. 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 and quality control and often dedicated lines. The study suggests that non-virgins collected will often be resold and sometimes resold several times at lower values. Eventually, many will become scrap and will likely be landfilled or recycled.

	<b>Toner</b>	<b>Ink</b>
User Landfills	79%	85%
Reman collects & landfills	4%	2%
<b>Total cartridges to landfill</b>	<b>83%</b>	<b>87%</b>
Reman collects & recycles or send to waste-to-energy	17%	13%
<b>Total</b>	<b>100%</b>	<b>100%</b>

There is increased pressure on businesses that are running cartridge collection schemes to maintain environmentally friendly collection. No matter where a company sits in the industry, collections are expensive and difficult to operate. 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, and today's laws govern the collection and recycling of used electronic equipment such as printers and copiers. While these regulations have not specifically covered supplies, such as toner and inkjet cartridges, to date the revised WEEE directive is expected to include printer cartridges containing electrical parts as EEE. This is expected to change the landscape considerably regarding collection and end of life solutions over the coming years. In response, the supplies industry has already shifted to participate in more plastics grinding/recycling, incineration and waste to energy activities instead of landfill. Furthermore, large remanufacturers are more willing to collect and reuse their own brand remanufactured laser cartridges; however, this has had a minimal impact on the total as yet.

## Key Findings

- 79% of toner and 85% of ink cartridges are remanufactured only one time, which means that 21% of toner and 15% of ink cartridges are remanufactured more than once. The failure rates for non-virgins are higher than for virgins. To successfully remanufacture one cartridge, remanufacturers need to collect 1.1 virgin toner cartridges and 1.2 virgin inkjet cartridges. Although they are not as desirable, remanufacturers often collect non-virgins as well, and this changes the metrics. Now, 21% of remanufactured toner cartridges are from non-virgin empties. Some are damaged or have a number of foreign components, making them less reliable for remanufacturing. For inkjet, 15% of remanufactured cartridges are from non-virgin empties, so 1.43 non-virgin cartridges are required to remanufacture one. We estimate that 1.35 non-virgin cartridges are required to remanufacture one toner cartridge.

- 18% of toner and 27% of ink cartridges collected by remanufacturers are unusable. Of these
  - 20% of toner and 15% of the ink cartridges and replacement parts go to landfill.
  - 50% of toner cartridges and 45% of ink cartridges/parts are recycled into new products or raw materials.
  - 30% of toner and 40% of ink cartridges/parts go to waste to energy.
  - There are various factors at play for unusable cartridges. The toner cartridges are subject to damage during shipping and handling as well as some breakage during processing. Toner cartridges from very old printers or other items are just not remanufactured (e.g., Xerox toner kits) and there is an increased number of clone cartridges among collections.
  - 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. Many toner kit type cartridges still are not remanufactured though that is changing.
  - For inkjet, 27% of the cartridges that remanufacturers collect are not re-used. Cartridges that are considered extra because they are from a vendor that has cartridges that are undesirable for remanufacturing larger for inkjet than for toner cartridges because many are Canon or Epson brands, or some other tank that is generally not remanufactured. The ink/toner proportion has decreased considerably since the last report as there are now more companies remanufacturing ink tanks than before. Inkjets have more issues with drying out (affecting the nozzles and internal electronics) than toner cartridges, and, therefore, a higher proportion remain unusable.
- 83% of toner and 87% of remanufactured ink cartridges sold will ultimately be thrown away. 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. To date, however, such efforts, to the extent that they exist, are not impacting the overall numbers. .
- Most remanufacturers still would prefer not to remanufacture their own cartridges but are more willing to take them back because they know how the cartridge was previously processed and are fulfilling their commitment to the environment.
- Large remanufacturers routinely replace the components and will re-use the hulk to the extent that their own cores come back to them.
- Toner parts replaced most often include the drums, charge roller, wiper blades, 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. Significant increase in plastics grinding/recycling and waste to energy processing among the top laser and inkjet remanufacturers.
- Empties from brokers are certified and ready to be remanufactured while the remanufacturer collection programs require sorting.
- Remanufacturers with their own collection companies rely on captive brokers for 90% - 99% of their empties, some even sell excess empties into the market.
- Often, smaller remanufacturers purchase in excess of 40% of their cartridges from outside brokers.

## About InfoTrends

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