The evolution of more sustainable print consumables

Printers have developed a lot since the 1980s, but the improvements in the supplies that go with them have been equally significant.

It may seem like the core business printing technologies haven't changed much over the last 40 years. In the 1980s, laser printers capable of printing a few pages a minute became affordable for business use, having come down in price to a few thousand dollars. They have been the dominant technology ever since. But there have been considerable smaller developments over the years, particularly in the way consumables are supplied. In this feature, we will trace the evolution of printer supplies, looking at the key changes in technology and the effects they have had, culminating in the eco-conscious developments we're seeing today.

From Daisywheel to Laser

Going back to the 1980s, the majority of printing was still being performed by daisywheel and dot-matrix devices. The first daisywheel printers were essentially automated versions of typewriters. Ribbons were used to provide the supplies of ink in the same way.

The dot matrix printers that were the daisywheel's contemporaries weren't that far off in technology, either, as they also used ribbons of ink. This was an ink delivery technology that had been around for a hundred years by that point, with the first impact typewriters arriving in the 1870s.

Contemporary dot matrix printers still use pretty much the same technology, with ribbon rolls the main supplies. It is possible to recycle those ribbons by replenishing them with ink, but this is hardly a widespread activity.

In contrast, laser printers brought with them a significant change in how consumables were delivered, as the ink wasn't so intrinsically linked to the package it was delivered in. Back in the 1980s, waste wasn't a major issue, and most companies still threw away the cartridge after its toner contents were spent. But the possibility of the container outliving the ink within it was there, which would lay the groundwork for recycling.

The Rise of Waste Reduction

Although even by the early 1990s, recycling still wasn't a significant factor to most businesses, there were manufacturers already beginning to consider it. HP's Planet Partners programme was launched in 1991 for LaserJet cartridge return and recycling. It has gone from strength to strength. Since 2000, more than 218 million pounds (99 million kilograms) of recycled plastic have been used in manufacturing new Original HP ink and toner Cartridges, diverting almost 5,450 tractor-trailer loads of plastic from reaching oceans or landfills[1]. Today 80 percent of HP's ink cartridges and 100 percent of its LaserJet toner cartridges use recycled materials.[2]. In particular, HP has been using recycled plastic bottles collected in Haiti and from other sources in the manufacturing of Original HP Ink cartridges. This effort helps to create sustainable jobs, brings opportunity to the people in Haiti, and helps prevent plastics from reaching the Caribbean Sea [3].

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Printers consume other supplies than just toner and cartridges. Electrical consumption is also a significant factor. When they first arrived, laser printers required a lot more power than their daisywheel and dot matrix competitors, and this continues to be the case. A typical dot matrix printer might use 60W when printing, whilst a typical laser printer needs more like 250W, although the latter's speed means it's active for less time per page.

Nevertheless, laser printer per-page costs remain higher overall, at around ten times the price per page of a dot matrix printer. But high-resolution graphics and type isn't possible with dot matrix technology. Redesigning the printer supplies rather than the printer can have major effects on these figures, however. HP has bundled a bunch of technologies into its JetIntelligence cartridges for its LaserJet range. This includes ColorSphere 3 toner, which melts at a lower temperature for reduced power consumption. The toner has a hard shell for higher yields and a spherical shape, which also increases the number of pages that can be printed. The toner seal is also removed automatically during installation, reducing the time it takes to change your toner cartridge.

Overall, **JetIntelligence** means more pages per cartridge, less cartridge wear, and there are also more dependable gauges, so you don't swap a cartridge out when it still has some toner left inside. There's another indirect benefit for reduced waste from improved, more dependable print quality. Poor prints and paper jams mean having to rerun the print job, which is very wasteful. Keeping reprints to the minimum means less wasted paper. Making duplex printing the default can also potentially halve the amount of paper used.

There are other physical consumables to consider as well. The imaging drum is often part of the toner cartridge in a laser printer, but generally outlasts the toner unless damaged. This is fine if the cartridge is recycled, but wasteful if not, so being able to replace this drum only when needed reduces resource consumption.

The ecological friendliness is not just about the power, replacement parts and ink or toner consumption of the printer itself, either. A cartridge with a higher yield can also help reduce the number of times replacement cartridges need to be delivered, and the quantity of packaging that is required, since fewer boxes will be used. This means less fuel is consumed for deliveries, as there are fewer of them. HP's Instant Ink even allows the printer to order its own replacement cartridges when it senses supplies are getting low [4].

The Rise of the Business Inkjet

Although laser printers have been the mainstay of business for decades, their dominance has been under attack recently. The status quo was for laser printers in business, and inkjets in the home, because the latter could provide better-quality graphics output for a lower initial outlay for the printer itself, although volume running costs were usually higher. Conversely, the inkjet could not find a place in business because it was slower and more expensive to run compared to a laser or LED printer, albeit cheaper to buy in the first place.

But that all changed with the arrival of HP's **PageWide technology**. Whereas a laser printer uses a laser directed by a mirror to "write" the image of the page to be printed as electrical charge on a drum, allowing lots of pages to be output per minute, an inkjet has to physically move its print head across a page to print each set of lines, and it has to do this many times to complete the page. HP's PageWide technology removes this necessity, because it essentially uses a head that is the width of a page, so it doesn't need to move.

This has allowed inkjets to take up their place alongside lasers in businesses. In fact, the OfficeJet Pro X even managed to surpass the laser in speed terms. The OfficeJet Pro X551dw gained the official Guinness World Record in 2012 for fastest time to print 500 sheets [5].

Taking Printing to a New Dimension

Printer supplies will change more radically, however, if predictions about the rise of 3D output turn out to be valid. In only three years, from the end of 2014 to 2017, the total number of desktop 3D printers sold has nearly tripled, a 42 per cent CAGR [6].

Far from fading out of use in our increasingly virtualised digital business landscape, the future of printing looks healthier than ever.

LINKS:

(1) As of 2017. Based on a nominal payload of 40,000 pounds (18,000 kilograms)

(2) First cartridges now printing, 3BL Media, April 2018
https://3blmedia.com/News/First-Cartridges-Now-Printers-HP-Raises-Bar-Recycling

(3) HP Creates Social and Environmental Impact in Haiti with Launch of Ink Cartridges Made from Recycled Bottles, HP Press Center, June 2017
https://press.ext.hp.com/us/en/press-releases/2017/hp-creates-social-and-environmental-impact-in-haiti-with-launch-.html

(4) Ordered by your printer when needed, subject to customer internet connection. Availability may vary in exceptional circumstances. Express deliveries available via Support Services, if you use more ink than anticipated. See hp.com/go/instantinksupport for troubleshooting assistance and contact support options

(5) Hewlett-Packard Officejet Pro X551dw takes printer world record, Guinness World Records, Feb 2013
http://www.guinnessworldrecords.com/news/2013/2/hewlett-packard-officejet-pro-x551dw-takes-printer-world-record-326496

(6) Half a million 3D printers sold in 2017 – on track for 100m sold in 2030. 3D Printing Industry, April, 2018:
https://3dprintingindustry.com/news/half-million-3d-printers-sold-2017-track-100m-sold-2030-131642/

c06407936, July 2019