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Ink Usage in Inkjet Printers

Ink is used in a number of ways throughout the inkjet printing process. In general, ink in an ink cartridge is used for printing documents, photographs and other such materials. Some ink, however, must be used to maintain the health of the print head; some ink is residual; and some ink evaporates. These uses of ink are common, in varying degrees, to printers from all inkjet printer manufacturers.

The methodologies used to measure page and photo yield do not account for all the uses of ink described above and therefore your actual yield may vary considerably from the published yield (see [Inkjet page yields](#) and [Inkjet photo yields](#)). HP designs its inkjet printer systems to deliver outstanding value in printing customer documents while using enough ink to maintain a reliable printing system that delivers outstanding print quality over the life of the printer.

In the printing process, some ink is used to prepare the printer for use

HP offers two general inkjet print head designs: integrated into the ink cartridge (Integrated Print Head: IPH), and a long-life print head integrated into a printer which has Individual Ink Cartridges (IIC). Both IPH and IIC printers commonly perform start up and calibration processes, which consume some ink, to ensure reliability and optimize print quality. IIC printers also may use ink to prepare the long-life print head for use by purging storage fluid from and pumping ink through the print head. IIC printers may use more ink in start-up than IPH printers as a result of these additional start-up procedures. When a replacement cartridge is installed in either IIC or IPH printers, replacement cartridge start-up routines require some ink.

Some ink is used to service the print head and prevent clogging

Print head nozzles get clogged over time, most commonly by microscopic dust particles or dried ink. Nozzles are kept clean by servicing, including wiping the surface with a small rubber wiper, ejecting ink through the nozzles to purge particles and to prevent drying, and pumping with ink to clean the print head. To keep the printer ready to print in either color or black, these service routines typically consume some ink from every cartridge, even if only black or color is used in the document being printed.

Tiny bubbles of air form in the ink over time and can block the flow of ink in long-life print head printers (IIC). In some IIC printers, air bubbles can be caused by an ink cartridge change. Air bubbles can be removed by pumping them out of the print head. When removing these air bubbles, some ink is also removed. On IIC systems, multiple colors may use the same print head. When a single color cartridge is changed, some ink is also consumed from the other color ink cartridges using the same print head.

Time between print jobs impacts ink available for printing

The amount of ink available for printing depends on several factors, including printing habits and how the printing system uses ink both to print pages and to maintain reliable performance. In general, printers used regularly will consume less ink for servicing. Compared to short times between print jobs, longer periods between print jobs require more aggressive routines to service the print head nozzles. These more aggressive routines use more ink. Service routines may also be triggered by other events, such as the amount of ink used or reinstalling an ink cartridge that has not been used for an extended period of time.

Some ink is residual

Ink cartridges must store ink without leaking when handled, but allow the printer to extract the ink when needed. When the cartridge is depleted, the majority of ink has been pulled out of the cartridge. Just as it's impossible to remove all of the toothpaste from a tube of toothpaste, it's impossible to remove all of the ink from an Ink cartridge. In addition, when a

tri-color cartridge is replaced, some residual ink may remain as the colors may not have been used at the same rate.

Some ink evaporates over time

Ink cartridges lose some ink to evaporation over time. This lowers the volume of ink available, and may change the chemistry of the inks. Cartridges cannot be completely sealed due to altitude variations during shipment and temperature variations during storage and use. HP cartridges are designed to operate reliably after a long pre-sale shelf life, and throughout many months of usage once installed in the printer.

Some color ink may be used when printing black text-or-graphics

There are several circumstances when color ink may be used—primarily to improve print quality, and sometimes to improve printer reliability—even if the document appears to be only black text-and-graphics. Many HP printers utilize chemical interactions to improve the quality and permanence of plain paper black text-and-graphics by adding small amounts of color ink to certain black areas. Some dark images which look black may contain a combination of black and color inks. For black and white images and photos, a blend of colors called "composite black" may be used to achieve significantly better image quality and smoother gray tones than can be accomplished with black inks alone. Some inkjet printers utilize pigmented black ink, which is incompatible with some inkjet photo paper. In this case, dark or black areas are made up of color inks. Page yield testing is conducted with all cartridges (black and color) installed in the printer. For more information see [Inkjet page yields](#).

For users who wish to print utilizing just black ink (despite the reduced print quality), many HP printers offer options. For example, a driver color setting (by selecting "print in grayscale with the black cartridge only" in printing preferences) specifies printing using only black ink. In addition, many HP printers can operate in "reserve mode," which allows the user to continue to print with just the black cartridge when the color cartridge is removed or not installed. In HP IIC systems, all supplies are required to be installed in the printer for the printer to function.

User Choice (print modes)

The user can also influence how much ink is used to print a photo or a document. By selecting different print modes in the driver, the amount of ink used to print the document can be changed. In general, all plain paper draft modes will have lower print quality and use less ink than the default plain paper normal mode.

Conclusion

Ink is used in a number of ways throughout the printing process, from preparing the printer to print to the actual printing of documents, photographs and other materials. HP designs its inkjet printer systems to deliver outstanding value in printing customer documents while using enough ink to maintain a reliable printing system that delivers outstanding print quality over the life of the printer.

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