

Original HP toner cartridge: A look inside



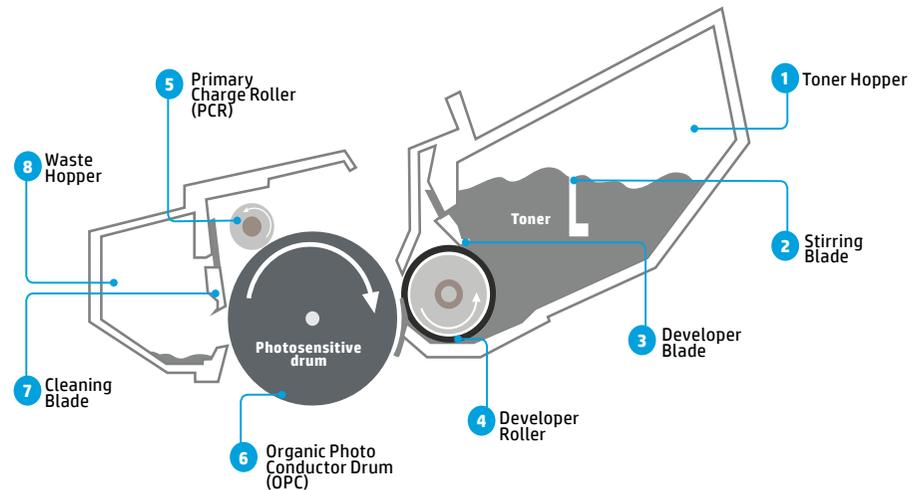
Up to 70% of the printing technology is in the Original HP toner cartridge¹

What is?

A toner cartridge is at the heart of your laser printer. It operates at full potential when it is accurately calibrated, aligned, and its components are working in union with each other. With this in mind, is it really a good idea to buy non-HP cartridges that may have been cloned or drilled, sawed and pried apart and then glued or screwed back together? HP innovators don't think so and would like to tell you why! There's much more to a toner cartridge than meets the eye.

To achieve the highest quality and reliability, the HP LaserJet cartridge and LaserJet printer are designed together as an integrated system. Each HP cartridge is designed to work seamlessly with your HP LaserJet printer. In fact, **up to 70% of the printing technology is in the Original HP cartridge¹**. The cartridge is not simply a plastic container that holds powder. The HP cartridge, and the toner within, are designed to precise specifications for the device speed, size, charging characteristics, fusing properties, environmental conditions, and desired paper type. These specifications ensure that customers get the legendary reliability and print quality they expect from HP.

As the cartridge is the heart of the print system, the toner is the heart of the cartridge system. Yet, without the cartridge components working seamlessly together with the toner to ensure optimal charge and performance, it will fall short on reliability and print quality. HP uses leading-edge technology and precision manufacturing to create LaserJet cartridges that produce topnotch results. Here is a brief on the Electrophotographic process (EP process), the components involved, and some likely trouble spots that could cause defects and failures when using a non-HP cartridge.



1. Toner hopper:

Toner is stored in the hopper. For HP LaserJet printers there is no such thing as a universal toner. No single type of toner is going to function reliably and consistently in ALL devices. Toner properties are unique and scientifically blended to be compatible with a given printer's speed, fusing temperatures and toner charge requirements. Original HP toners are proprietary and not available for others to source on the market. Aftermarket competitors are challenged to duplicate the chemical and physical properties of the HP toner. The toner in non-HP cartridges can over or under charge and transfer differently than Original HP toner. This means that either too much or too little toner will be put on a page and print quality will suffer.

2. Stirring blade:

As the cartridge rests between prints, the toner settles. The weight of the toner particles cause them to sink while the air is forced out, or rises. When printing, it's important to have air circulating so the toner moves freely. HP created "no shake" cartridges which include a set of stirring blades that keep the toner fluffed up and flowing freely inside the cartridges during all printing operations. After you select "print", the initially settled toner is

stirred in the developing unit and pushed towards the developer roller as it is aerated and partially charged. Remanufacturers often reuse a stirring blade and over time it may lose its strength and ability to rotate, leaving unused toner in the hopper.

3. Developer blade (aka Doctor blade):

As toner accumulates on the developer roller, the toner passes under the developer blade which shears a layer of toner off to a consistent height. During this process, a charge is generated on the toner before it transfers to the OPC drum. The toner charging occurs through the process of mixing in the hopper and being rubbed by the developer blade as the roller rotates. This process of charging the toner is called tribo-charging. In faster devices, it is critical that the toner can be uniformly charged fast enough to deliver the first page out. The charging process then has to keep pace as more pages are printed. Toner acts as a lubricant on the developer blade to prevent streaks, noise and other defects. Reusing a blade can cause defects such as white streaks due to a worn and dirty blade where debris gets caught under the blade. A blade can also become misaligned or have the incorrect tension causing a defect where one side of the page is darker than the other.

¹ Based on Original HP colour and monochrome All-In-One cartridges and the EP process steps required to print a page.

4. Developer roller (aka Mag roller or Mag sleeve):

This roller has a magnetic sleeve that attracts toner particles onto its surface and transfers them to the OPC. The amount of toner on the roller is controlled by the developer blade, which uses pressure to keep the amount of toner constant and causes a static charge to build on the toner. As the developer roller rotates, the toner is “pushed” toward the OPC.

Thin seals are used along the roller and around the gears to prevent toner from leaking. The seals are normally not replaced and can easily be damaged during the remanufacturing process. This can lead to toner leaks. The roller’s outer coating can easily be damaged, so if it isn’t replaced during the re-manufacturing process—or if a roller is misaligned—it can cause banding or repetitive defects on prints.

5. Primary charge roller (aka PCR):

This multilayered roller applies a uniform charge on the OPC drum to prep the drum to receive a new image. Reused PCRs often cause non-uniform charging or are damaged, so they don’t fully charge the OPC drum. Similarly, new after-market PCRs used in re-manufactured or new build (compatible) cartridges may not be precisely matched to the drum. Defects in a PCR equal defects on the printed page.

6. Organic photo conductor drum (aka OPC, or Imaging drum):

The OPC drum is a thin walled aluminium cylinder, coated with specially pigmented photo conductive substances. The laser strikes the OPC surface, creating an image one line at a time.

The toner is then transferred from the surface of the OPC to the paper by the transfer roller (not shown – this component is inside the printer, not the cartridge). This process applies a positive charge to the underside of the paper which attracts the negatively charged toner from the OPC

pulling the toner image onto the paper. The paper has the toner image electrostatically held in place and is now passed to the fusing unit, within the printer, where toner is permanently fixed to the paper by applying heat and pressure.

OPCs are designed to work with the printer’s laser and other cartridge components (toner, developer roller, PCR, cleaning blade). An aftermarket drum may not be matched as a system with other components. A re-used image drum can also have problems such as scratches on the surface, or the drum coating may be significantly worn down in thickness. Image drums experience both mechanical and electrical wear, and have a limited life. Worn drums collect less toner for the same image and thus reduce the quality of the final prints.

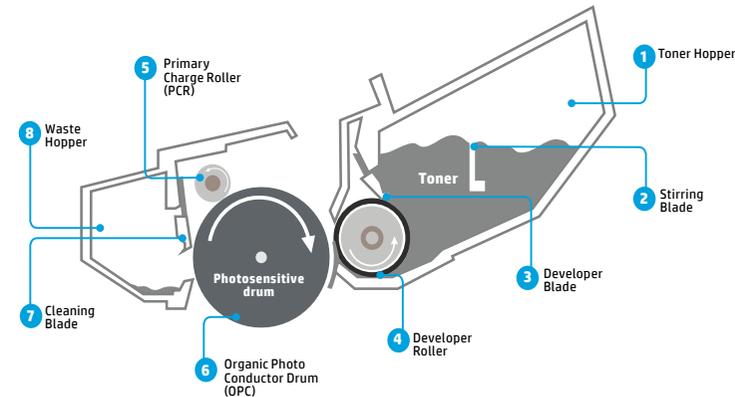
7. Cleaning blade (aka Wiper blade):

After an image is transferred to the paper, the cleaning blade contacts the OPC and scrapes any residual toner and dust and paper fibres from the drum. There is always a little bit of toner left on the image drum. Toner acts as a lubricant on the cleaning blade to prevent damaging the OPC. To thoroughly clean the inside of the cartridge

during remanufacturing, the blade must be removed and cleaned, or replaced entirely. Proper reassembly is extremely difficult and the cleaning blade’s alignment and tension against the OPC is critical to imaging performance. Remanufacturers and new build cartridge producers may also add high quantities of dry lubricants to the wiper and OPC to prevent friction. These lubricants may later break loose and cause print defects.

8. Waste hopper:

Toner particles left behind and other debris picked up during transfer are deposited in the waste hopper after they are scraped off by the cleaning blade. Thin seals are used to prevent toner from leaking from the waste hopper. During the remanufacturing process, the seals are normally not replaced and can easily be damaged which can lead to toner leaks. Preparing new build or remanufactured cartridges, the toner hopper may be over-filled to achieve higher yields than the OEM. The result—the waste toner hopper can fill to capacity before the cartridge is empty, causing printer damage and print quality defects when toner leaks into the printer. Using inferior toner might also cause poor toner transfer, with the extra toner on the OPC getting scraped off and prematurely filling the waste toner hopper.



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