How Laser Printer Work

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***Abstract*—Many from people use Laser Printer. But, most people do not know how the laser printer work. Laser Printer works not too complicated. There are at least two basic physics concepts are applied to the laser printer, it is Charge and Heat. Charge is used to move the toner to the paper, while hot to strengthen toner adhesion to paper.**

I. INTRODUCTION

In this modern era there is a lot of devices that have high technology which is can help humans work. Not only related to the ease, but also with time efficiency. In the field of technology, we recognize a wide variety of output devices. The output device is divided into several sections such as the output device in the form of text, output device in the form of graphics, output devices in the form of audio, and output devices in form of video. From many such devices, one of which is a printer. Printer also has several types such as ink-jet printers, photo printers, laser printers, thermal printers, mobile printers, label and postage printers, large-format printers, and plotters. Especially the laser printer, unlike a regular printer, laser printer uses a physics concept in its application. It is the difference in charge. This concept is used to attach charged toner particles to the paper that has been given the charge by the laser. The laser printer itself has many primary components such as paper transport, logic circuits, user interface, toner, toner cartridges, photosensitive drum, the laser, primary corona, transfer corona, fuser rollers, erase lamp, power supply, drivers, and software.

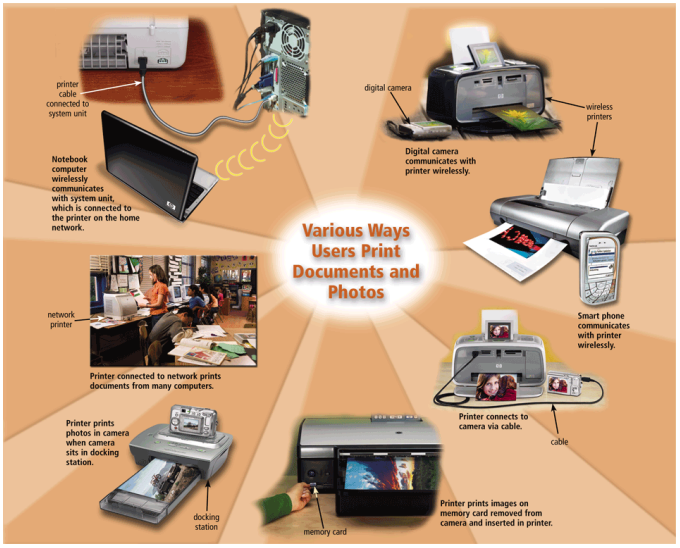

Figure 1. Various types of printer.

II. LITERATURE REVIEW

A. *Electric charge theory*

Electric charge is the physical property of matter that causes it to experience a force when placed in an electromagnetic field. There are two types of electric charges: positive and negative. Positively charged substances are repelled from other positively charged substances, but attracted to negatively charged substances; negatively charged substances are repelled from negative and attracted to positive. An object is negatively charged if it has an excess of electrons, and is otherwise positively charged or uncharged.

B. *Aplication of the difference in charge on a laser printer*

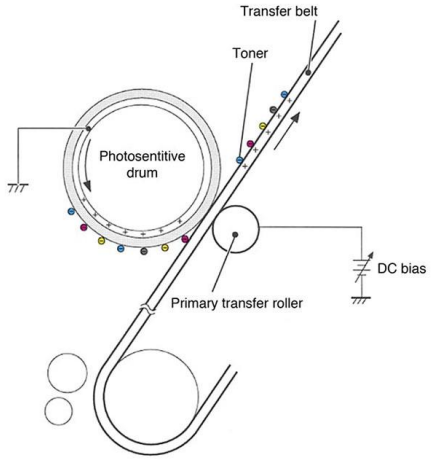

Figure 2. Toner transfer process which is a difference in charge theory concept

Laser printer uses the concept of the difference in charge in practice. Higher-end machines use a positively charged transfer roller on the back side of the paper to pull the toner from the photoreceptor to the paper that had previously been given a positive and negative charge by laser beam. So, toner with positive charge will stick to the paper that has negative charge because of the difference in charge possessed toner and paper.

III. Experimental Procedures

When you print something, your computer sends an information of electronic data (usually few megabytes or million characters) to your laser printer. An electronic circuit in the printer figures out what all this data means and what it needs to look like on the page. It makes a laser beam scan back and forth across a drum inside the printer, building up a pattern of static electricity. The static electricity attracts onto the page a kind of powdered ink called toner. Finally a fuser unit bonds the toner to the paper. And this is related detail work of laser printer :

1. Millions of bytes (characters) of data stream into the printer from your computer.
2. An electronic circuit in the printer (effectively, a small computer in its own right) figures out how to print this data so it looks correct on the page
3. The electronic circuit activates the corona wire. This is a high-voltage wire that gives a static electric charge to anything nearby.
4. The corona wire charges up the photoreceptor drum so the drum gains a positive charge spread uniformly across its surface.
5. At the same time, the circuit activates the laser to make it draw the image of the page onto the drum. The laser beam doesn't actually move: it bounces off a moving mirror that scans it over the drum. Where the laser beam hits the drum, it erases the positive charge that was there and creates an area of negative charge instead. Gradually, an image of the entire page builds up on the drum: where the page should be white, there are areas with a positive charge; where the page should be black, there are areas of negative charge.
6. An ink roller touching the photoreceptor drum coats it with tiny particles of powdered ink (toner). The toner has been given a positive electrical charge, so it sticks to the parts of the photoreceptor drum that have a negative charge (remember the difference in charge theory). No ink is attracted to the parts of the drum that have a positive charge. An inked image of the page builds up on the drum.
7. A sheet of paper from a hopper on the other side of the printer feeds up toward the drum. As it moves along, the paper is given a strong positive electrical charge by another corona wire.
8. When the paper moves near the drum, its positive charge attracts the negatively charged toner particles away from the drum. The image is transferred from the drum onto the paper.
9. The inked paper passes through two hot rollers (the fuser unit). The heat and pressure from the rollers fuse the toner particles permanently into the fibers of the paper.
10. The paper emerges from the side of the copier, but he paper is still warm.

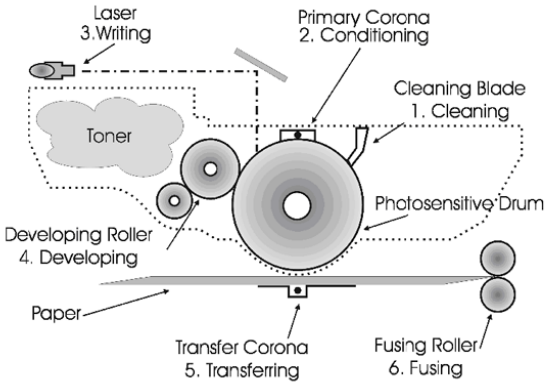

Figure 3. The processes on Laser Printer

IV. Result and Discussion

From the data obtained that the close connection to the physics concept of laser printers that are all around us. The concept is the difference of the charge which exist on the toner and paper. Due to differences in the toner may stick to the paper. Not only that, after the toner sticking on the paper, toner immediately tightened the paper by the fuser unit with a hot concept. So the toner can be stick strongly and emerges the image that we want.

V. Conclusion(s)

Many physics concepts used in the development of printers, especially laser printers. Which most at least use two basic concepts of physics in the form of a charge and heat. Charge is used to move the toner to the paper, while hot to strengthen toner adhesion to paper.

VI. References

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