ST JOHN DE LA SAL LE CATHOLIC SCHOOL

APPLICATION OF ELECTROSTATIC

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TABLE CONTENT

Introduction

- Electrostatics is a branch of physics that deals with the phenomena and properties of stationary or slow-moving electric charges. Electrostatic phenomena arise from the forces that electric charges exert on each other and are described by Coulomb's law.

- The electrostatic force is the force that exists between electrically charged particles or objects at rest. Examples of electrostatic forces: When we run a piece of paper with the oil in our head with the help of a comb produces electrostatic force.

Application of electrostatic

- The study of electrostatics has proven useful in many areas. This module covers just a few of the many applications of electrostatics.

van de graaff generator

Van de graaff generator is one application of electrostatic. It's is not only spectacular devices used to demonstrate high voltage due to static electricity—they are also used for serious research.for the first time it was introduced by Robert van de graaff in1931. for use in nuclear physics research. Van de Graaffs utilize both smooth and pointed surfaces, and conductors and insulators to generate large static charges and, hence, large voltages. A huge excess charge can be deposited on the sphere, because it travel quickly to the outer surface.

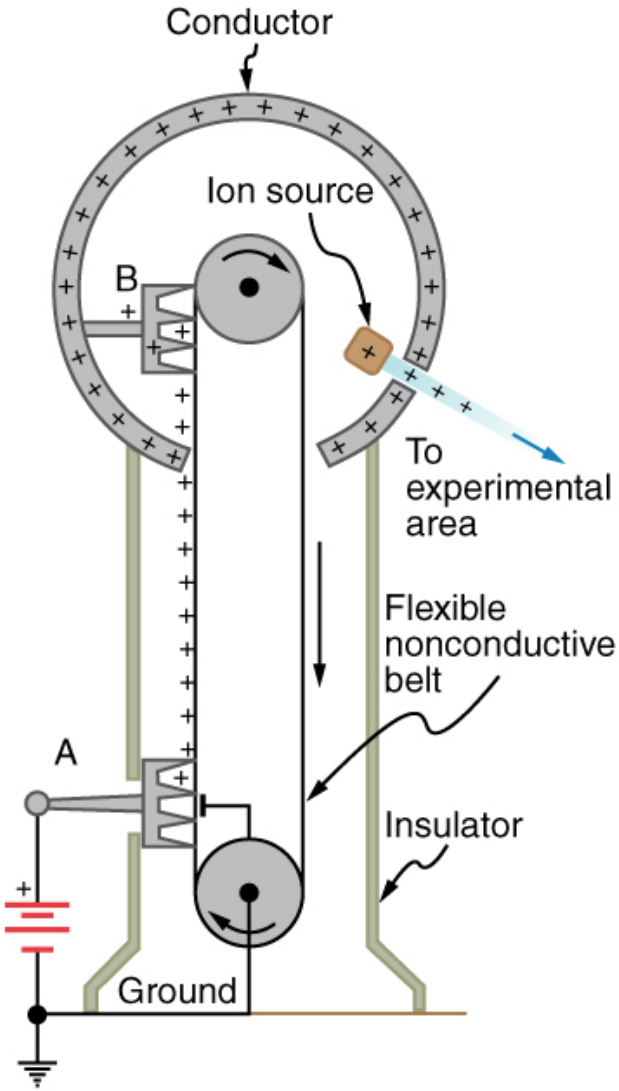


Figure: An image of van de graaffs generator

xerography

- Xerography is electrostatic process which used in most copies machine.the word is came from two greek words xero and graphos xeros means dry and graphos means for writing .
- A selenium-coated aluminum drum is sprayed with positive charge from points on a device called a corotron. Selenium is a substance with an interesting property—it is a photoconductor. That is, selenium is an insulator when in the dark and a conductor when exposed to light.
- Xerography has three stage process
- The first one is he conducting aluminum drum is grounded so that a negative charge is induced under the thin layer of uniformly positively charged selenium.
- The second stage process the surface of the drum is exposed to the image of whatever is to be copied. Where the image is light, the selenium becomes conducting, and the positive charge is neutralized. In dark areas, the positive charge remains, and so the image has been transferred to the drum.

- third stage was takes a dry black powder, called toner, and sprays it with a negative charge so that it will be attracted to the positive regions of the drum. Next, a blank piece of paper is given a greater positive charge than on the drum so that it will pull the toner from the drum.
- Finally, the paper and electrostatically held toner are passed through heated pressure rollers, which melt and permanently adhere the toner within the fibers of the paper.

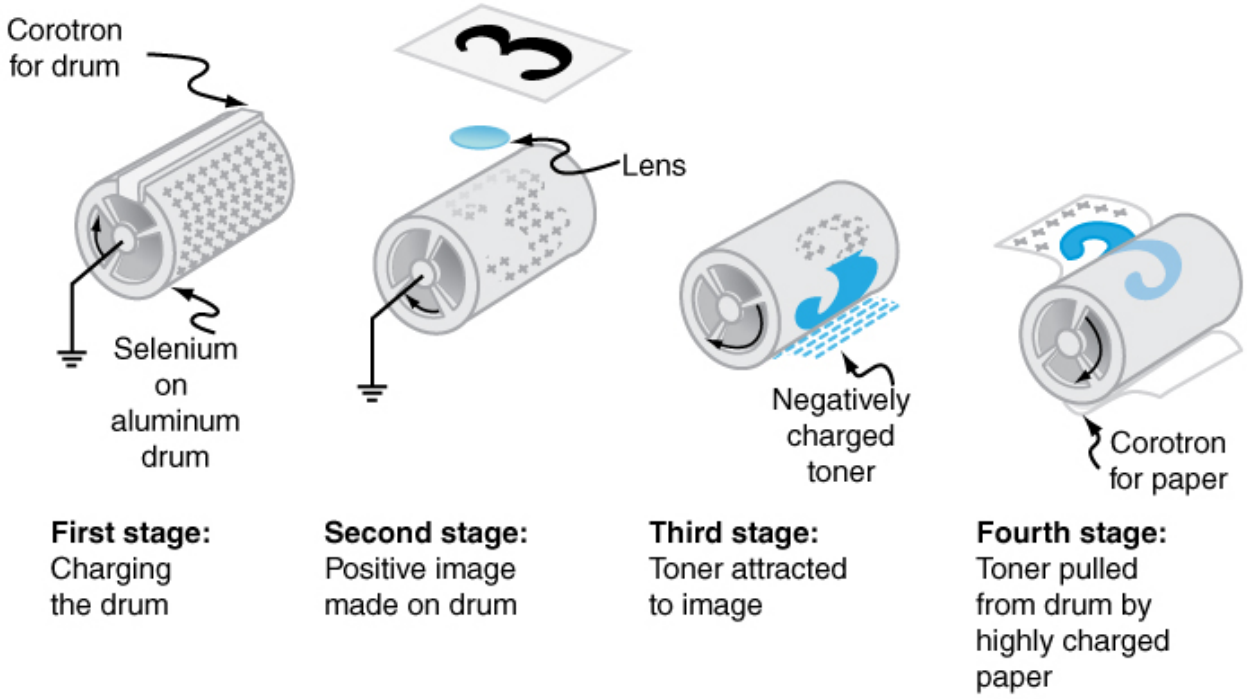


Figure: An image of xerography

Laser Printers

Laser printers use the xerographic process to make high-quality images on paper, employing a laser to produce an image on the photoconducting drum. In its most common application, the laser printer receives output from a computer, and it can achieve high-quality output because of the precision with which laser light can be controlled. Many laser printers do significant information processing, such as making sophisticated letters or fonts, and may contain a computer more powerful than the one giving them the raw data to be printed.

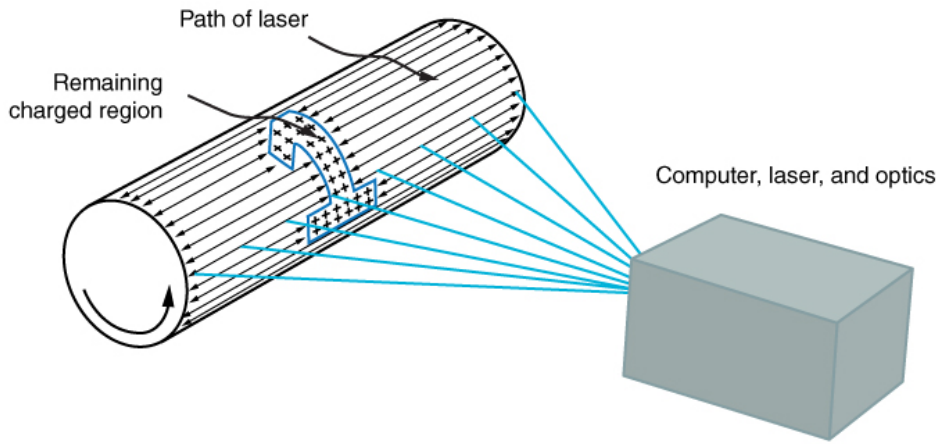
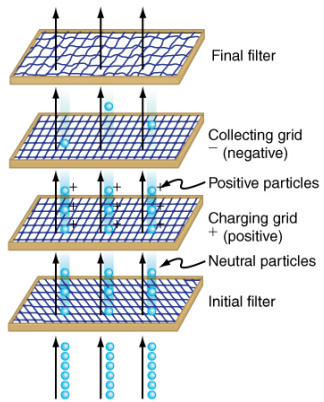


Figure: An image of laser printer**6**

Smoke Precipitators and Electrostatic Air Cleaning

- Another important application of electrostatics is found in air cleaners, both large and small. The electrostatic part of the process places excess (usually positive) charge on smoke, dust, pollen, and other particles in the air and then passes the air through an oppositely charged grid that attracts and retains the charged particles. (See Figure .)
- Large electrostatic precipitators are used industrially to remove over 99 percent the particles from stack gas emissions associated with the burning of coal and oil.



(a)


(b)

Figure: (a) Schematic of an electrostatic precipitator. (b) The dramatic effect of electrostatic precipitators **7**

Summary

- as you see electrostatic has different advantage from the lower (When we run a piece of paper with the oil in our head with the help of a comb produces electrostatic force, Balloons get attracted to another balloon when one of them are rubbed with hair.)to the higer xerography,van degraaff generator,laser printer and etc...
- so we have to learn properly.