

Xerography

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Xerography



Background/History

- Also known as Electrophotography or Electrostatic Imaging
- From greek radicals xeros and graphos
- Developed by Chester Carlson in 1938
- Patented in late 1942
- Xerox 914



The Xerographic Process

Most common uses – Digital printers and Photocopiers.

- The first step of the process deals with the charging of a Photoconductor. In most printing applications the photoconductor is a metal drum that is coated with amorphous selenium and mounted to rotate around its axis. Selenium is used because it is able to hold and conduct charges in the absence and presence of light.
- When the process begins the drum begins to rotate and a uniform electrostatic charge is distributed over its surface. The uniform charge is distributed by an electrical corona device which emits ionized gas molecules that are absorbed by the drum surface.

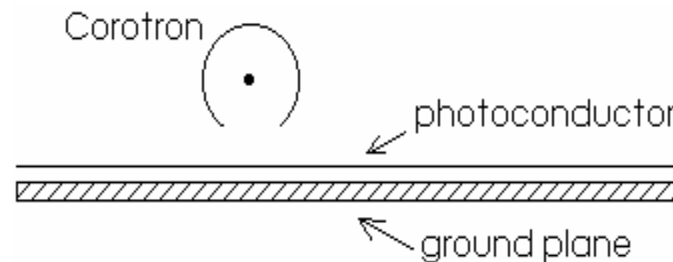
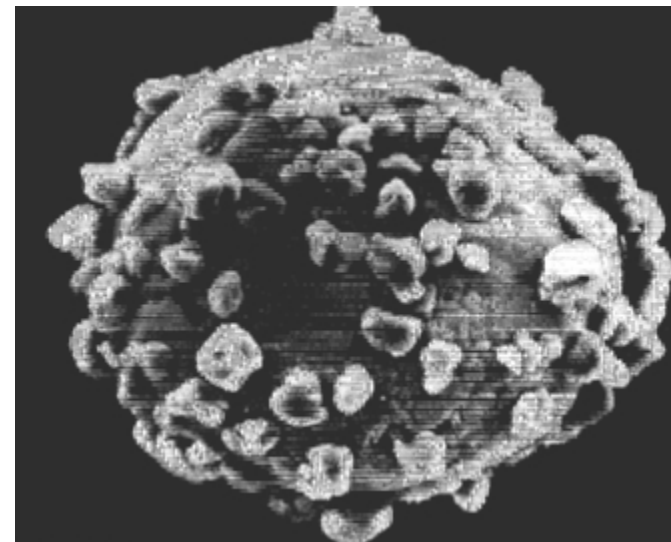
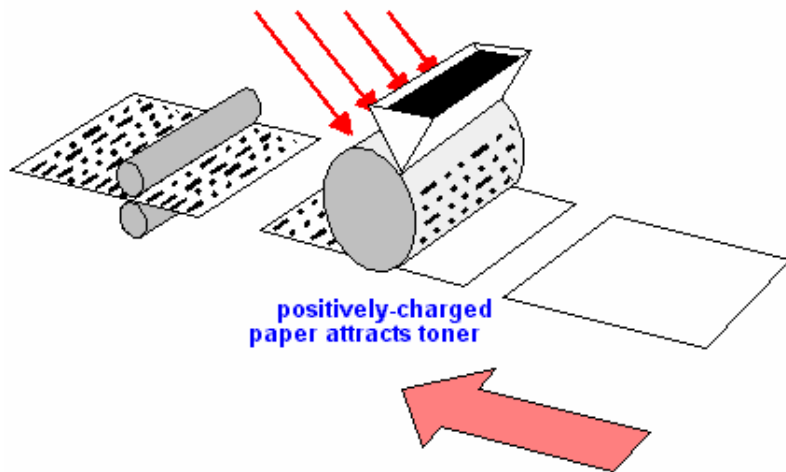


Figure 1.0: Corona Discharge.

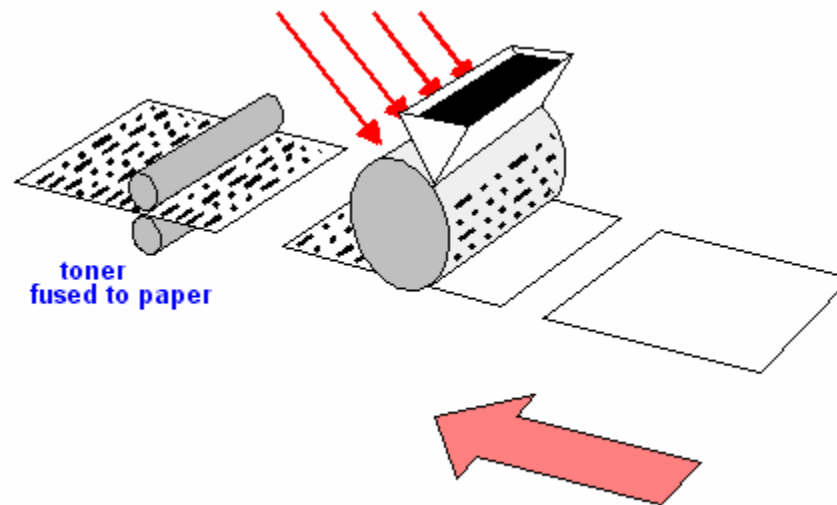
- Once the photo-conductor is charged a document begins to pass over the rotating drum. In most printing devices a laser is used to illuminate the document which projects an image onto the drum. As the drum is illuminated, light will only be able to pass through the document at positions where there is no text or image. This resulting image is referred to as the latent image.

- Once the toner particles are ready to be transferred by the carrier, it is time to transfer the image to a print medium.
- The print medium is brought very close to the toner carrier temporarily while a transfer corona device applies an electric field to attract the toner to the paper. This field overcomes the magnetic field holding the toner to the carrier resulting in a successful transfer.



Toner attached to carrier particle

- Right after the toner has been transferred to the medium, it is very loosely bound to its surface. At this point, rubbing the paper could remove the toner particles. A method is needed to fuse the toner to the paper.
- Fusing the image can be done using a combination of pressure, heat and radiant energy. Heated steel rollers are the most commonly used method for fusion.

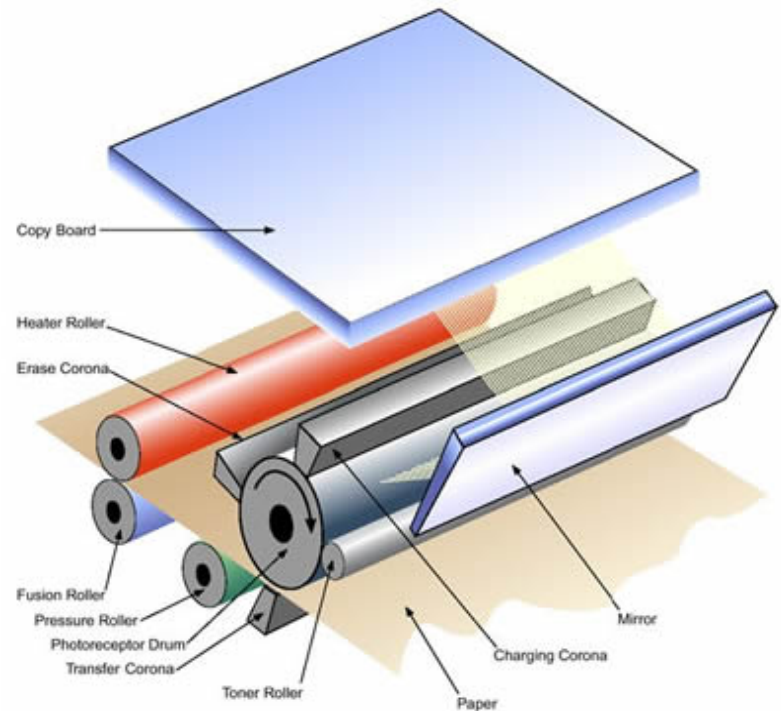


Wrap-up

- The first step in the Xerographic Process is to charge up a metal-drum Photoconductor uniformly by rotating it on its surface and applying an electrostatic charge.
- Next the document is passed over the surface of the photo-sensitive drum and is illuminated by a laser, this illumination creates the latent image by only passing through sections of the document without text.
- The image produced on the drum is then bonded with magnetically charged toner.
- The toner particles are next transferred to a print medium by a corona device generating an electric field with the ability to surmount the magnetic field of the toner, thus attracting the toner to the medium.
- Before the new document is ready the toner must be fused to the paper somehow. This is done by heated steel-rollers which generate the necessary combination of heat, pressure, and radiant energy.

Conclusion

- In conclusion Xerography is a process used very often in all different commercial and institutional environments.
- It is a highly technical process which uses many applications/principles developed in electromagnetic- field theory.
- It has been around for nearly $\frac{3}{4}$ of a century and it would seem as though it will be used for many years to come.



References

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