

History of Duplicating Processes

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History of Duplicating Processes

- ▶ Since Man began to write, he has established methods of making copies of his writing.



History of Duplicating Processes



- The first duplicating method was an engraved cylinder mounted on a frame and rolled over clay.

History of Duplicating Processes

- ▶ Up through the Middle Ages, scribes hand-copied manuscripts.



History of Duplicating Processes



- 1780
- James Watt invented a Letterpress Machine.
- Tissue Paper was pressed against original ink and was transferred.

History of Duplicating Processes

- 1805
- The Hectograph came into use.
- Aniline ink was transferred to a gelatin pad and then transferred to a sheet of paper.
- 200 copies could be made.





History of Duplicating Processes

- 1806
- Ralph Wedgewood patented carbon paper.
- Carbon paper uses pigments and wax.
- Carbon paper can be single use or reusable.
- Typewriter carbons are usually black.

History of Duplicating Processes



- ▶ 1844
- ▶ Charles Goodyear patented the process of vulcanization of rubber.
- ▶ This process made it possible to cut rubber stamps.

History of Duplicating Processes

- Modern Rubber Stamps are made of:
 - Vulcanized rubber
 - Laser cut rubber
 - Light hardened photopolymer
- Rubber stamps are more frequently used in foreign countries on legal documents.
- Hobbyist use stamps in the USA.



History of Duplicating Processes



- 1876
- Thomas Edison invented the Mimeograph.
- A stencil was cut with a stylus on a wax-coated fiber sheet.



History of Duplicating Processes

- ▶ When typing forms for the mimeograph machines, if you made a mistake, there was a sticky, blueish liquid in a small bottle that you painted (much like whiteout) over the mistake. When it dried, you could type over that area and correct the mistake.

History of Duplicating Processes

- ▶ 1923
- ▶ The Spirit Duplicator was invented by William Fitzerfeld.
- ▶ It used a ditto master which was coated with blue ink and transferred from a drum.



History of Duplicating Processes

- 1939
- National Cash Register patented carbonless paper.
- The paper is specially treated.
- When the two sheets connect because someone is writing on the paper, the chemicals create a copy of what is being written.

History of Duplicating Processes

The Facsimile Machine





History of Duplicating Processes

- 1842 – Alexander Bain a Scottish clock maker developed the concept for the fax machine.



History of Duplicating Processes

➤ 1843

➤ Bain transmitted a drawing over the wire using a device composed of pendulums that created a brown stain as it swung over chemically treated paper.



History of Duplicating Processes

- 1848 Frederick Bakewell used a cylinder and screw machine to transfer data.
- 1865 – Giovanna Caselli developed the first commercial fax machine in France.
- 1907 - Dr. Arthur Korn established the first fax system between London, France, and Berlin.

History of Duplicating Processes

- 1980 – Fax machines became standard office equipment.



History of Duplicating Processes



- ▶ 1950 – 3M introduced the first dry copy known as Thermo-fax
- ▶ This process is called thermography and uses heat-sensitive paper that was exposed to infrared radiation.

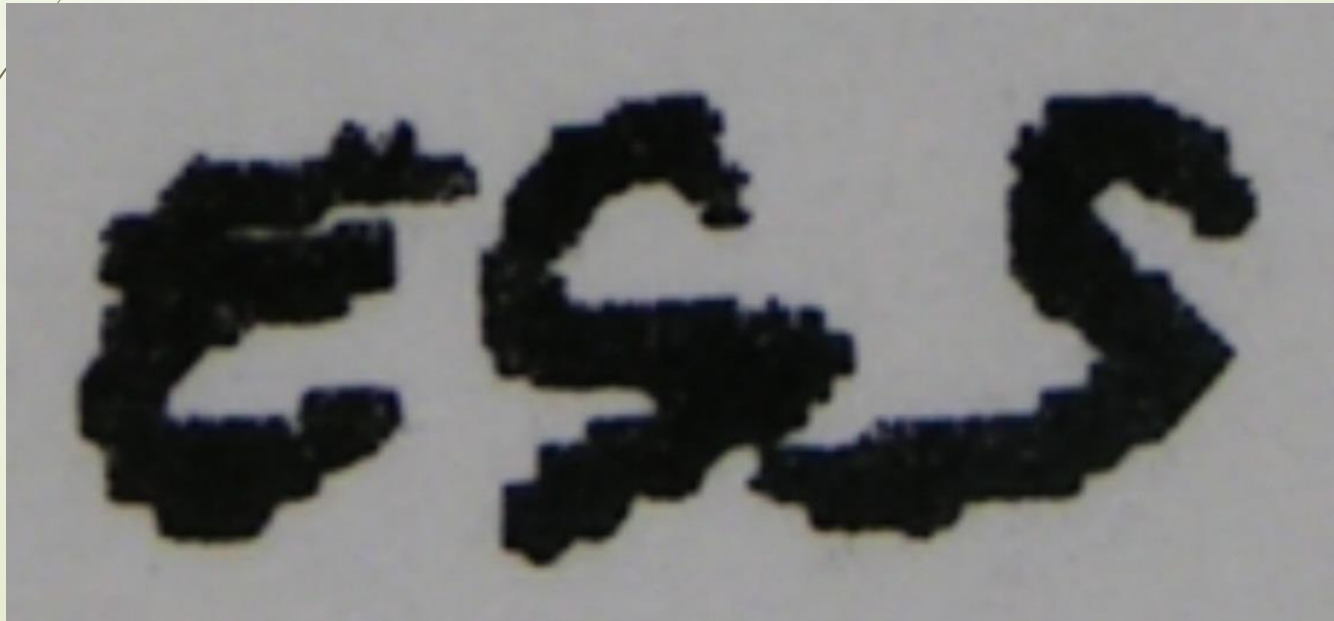
History of Duplicating Processes

- Original fax machines used thermal paper.
- Early machines created larger pixels.
- Modern fax machines print on plain paper.



History of Duplicating Processes

Pixels stand for picture elements.
An example of larger pixels.



History of Duplicating Processes





History of Duplicating Processes

- How can you determine if degradation in the exhibit is due to writing or the multiple-generation copy?

History of Duplicating Processes



History of Duplicating Processes

WITNESSES

TULSA FEDERAL CREDIT UNION

for JOHN CLOVE

History of Duplicating Processes

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History of Duplicating Processes

- 1980 – Standards were established that made it easier to communicate.
- Before that, only certain type fax machines could transmit data to similar machines.

History of Duplicating Processes

- Transmittal Terminal Identification known as TTI line is required on all faxed documents.

History of Duplicating Processes

Photocopiers





History of Duplicating Processes

- 1909
- Photostats appeared on the market.
- Photostat uses a camera on photographic paper.
- The image is developed using chemicals.

History of Duplicating Processes

- 1949 Diffusion transfer
- Wet-copy process
- 1952 – Kodak introduced the Verifax, Also a wet copy process.



History of Duplicating Processes

- 1950's
- Photocopies used a reflex copying technique that involves the direct transfer of material from the original to a copy.





History of Duplicating Processes

1950 Chester Carlson's copier became widely available.

- It was called xerography meaning dry writing.
- It was the most widely used method of duplication.



History of Duplicating Processes

- Xerography uses electrostatic charges and heat to produce copies on plain paper.
- The image is composed of pigment particles called toner.



History of Duplicating Processes

- Color copiers are now popular.
- Color copies were commercially available in 1963 by 3M.
- The first electrostatic technology was released by Xerox in 1973.



History of Duplicating Processes

- Modern photocopiers use digital technology.
- The copier consists of an integrated scanner and laser printer.
- The digital copier enables automatic collation since each page only has to be copied once.




Disadvantages of Photocopies

- 1. Alterations may be impossible to detect.
- 2. Copies do not show chemical alterations.
- 3. Inks cannot be differentiated.
- 4. Line sequence cannot be determined.




Disadvantages of Photocopies

- 5. Cannot determine direction of strokes.
 - 6. Copies may not be exact size.
 - 7. Copies are sometimes distorted.
 - 8. Copies do not reproduce details.
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Advantages of Photocopies



Photocopies leave Trashmarks that enable identification of the machine and the time a document was printed based upon the Trashmarks.



Advantages of Photocopies

- Trashmarks are the result of marks on the glass or a damaged drum.
- Trashmarks are in the same location if the problem is marks on the glass.
- Trashmarks are the width of the drum if the drum is damaged.



History of Duplicating Processes

- Forensic Identification of Duplicating Processes.
- Identification of typewriters, computer printers and copiers is based upon their imperfections.
- The mechanical tolerances of the toner and paper feed mechanisms cause banding.
- It is possible to identify a copy machine from its output.



History of Duplicating Processes

- Some high-quality color printers and copiers steganographically embed their identification code in printed pages as fine almost invisible patterns of yellow dots.
- Government agencies requested the identification to identify counterfeiting.



History of Duplicating Processes

- It may be possible to identify altered photocopies if:
 - 1. The altered parts are misaligned.
 - 2. A different generation of photocopy is used.
 - 3. Duplicate handwriting or signatures appear on other documents.



History of Duplicating Processes

- Scanners
- Scanners copy documents into computers as a “pict file.”
- A pict file is a digital representation.
- Scanners convert images into numbers that describe intensity.
- Images can be reproduced onto a printer.



History of Duplicating Processes

- Tremendous advances have been made since the beginning of record keeping.
 - Our computers and scanners and printers are the most recent innovations in duplication.
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