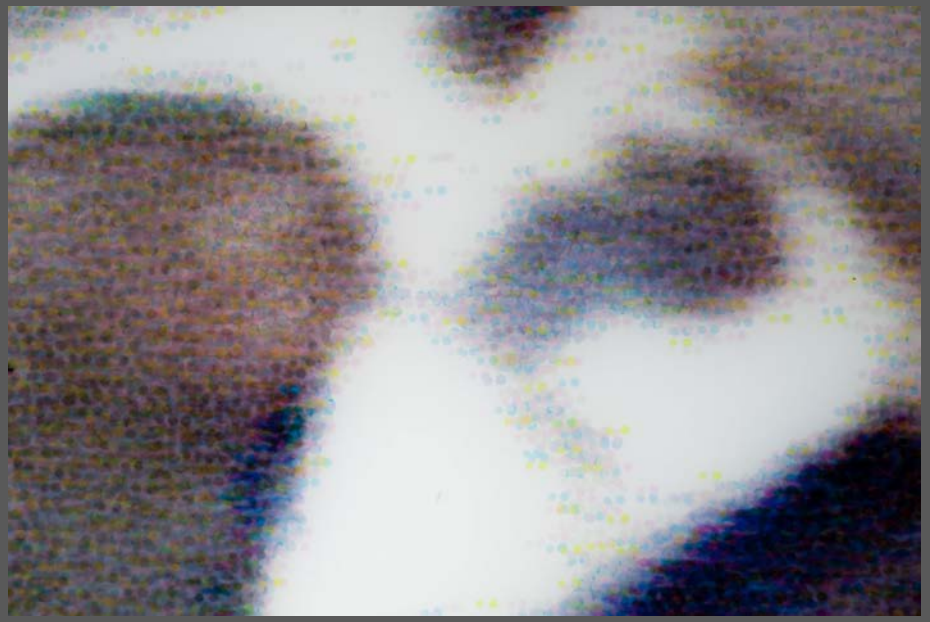
21st Century
Materials, Processes, Technologies



Photographic Process Identification Webinar #3

Image Permanence Institute
2017-2018

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Resources

Web Resources

- Graphics Atlas
  - www.graphicsatlas.org
- Digital Print Preservation Portal
  - www.dp3project.org
- George Eastman Museum Photographic Processes Series
  - YouTube
- How Digital Camera Sensor Capture Image - Charge Couple Device (CCD)
  - YouTube

Print Resources

- *The Digital Print: Identification and Preservation* by Martin Jurgens

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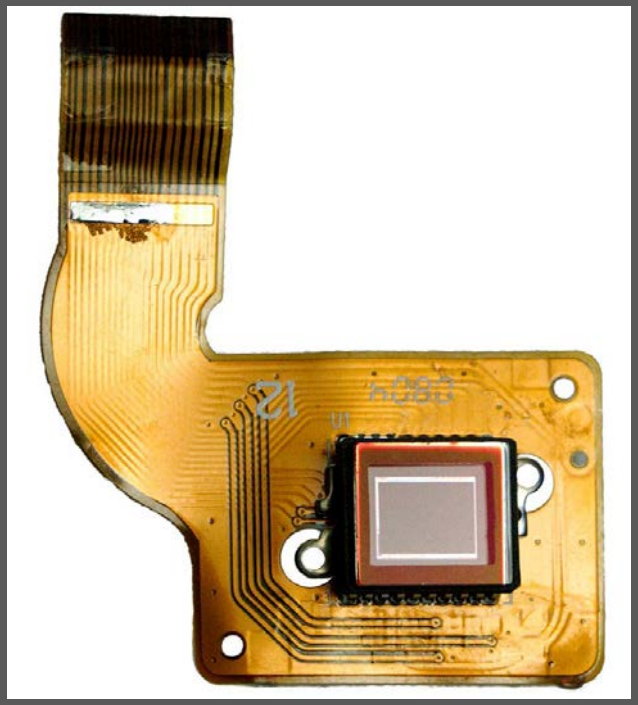
What is a Photograph?

- An image captured by an image sensor
  - Charged-coupled device (CCD)
  - Complimentary Metal Oxide Semiconductor (CMOS)



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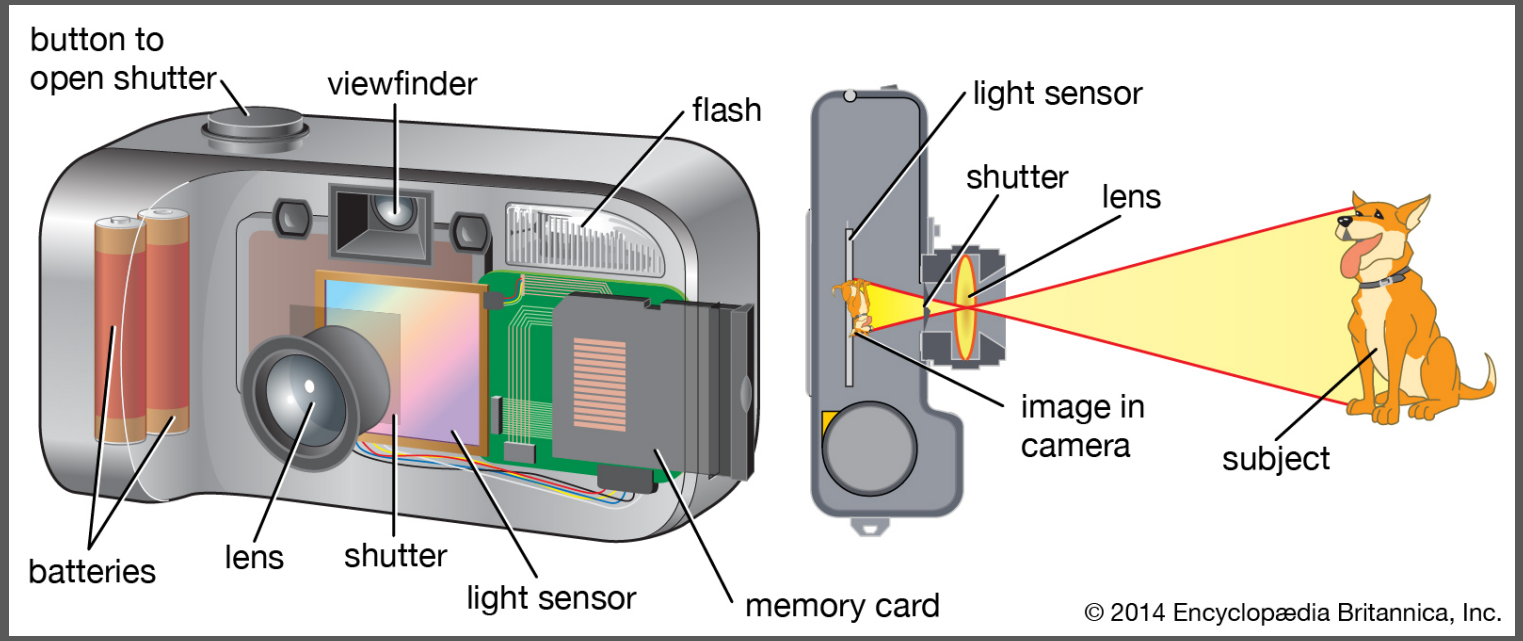
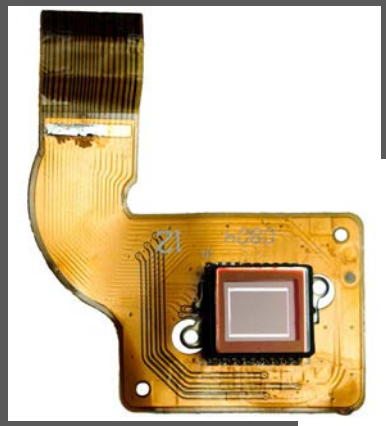
Digital Imaging Technology

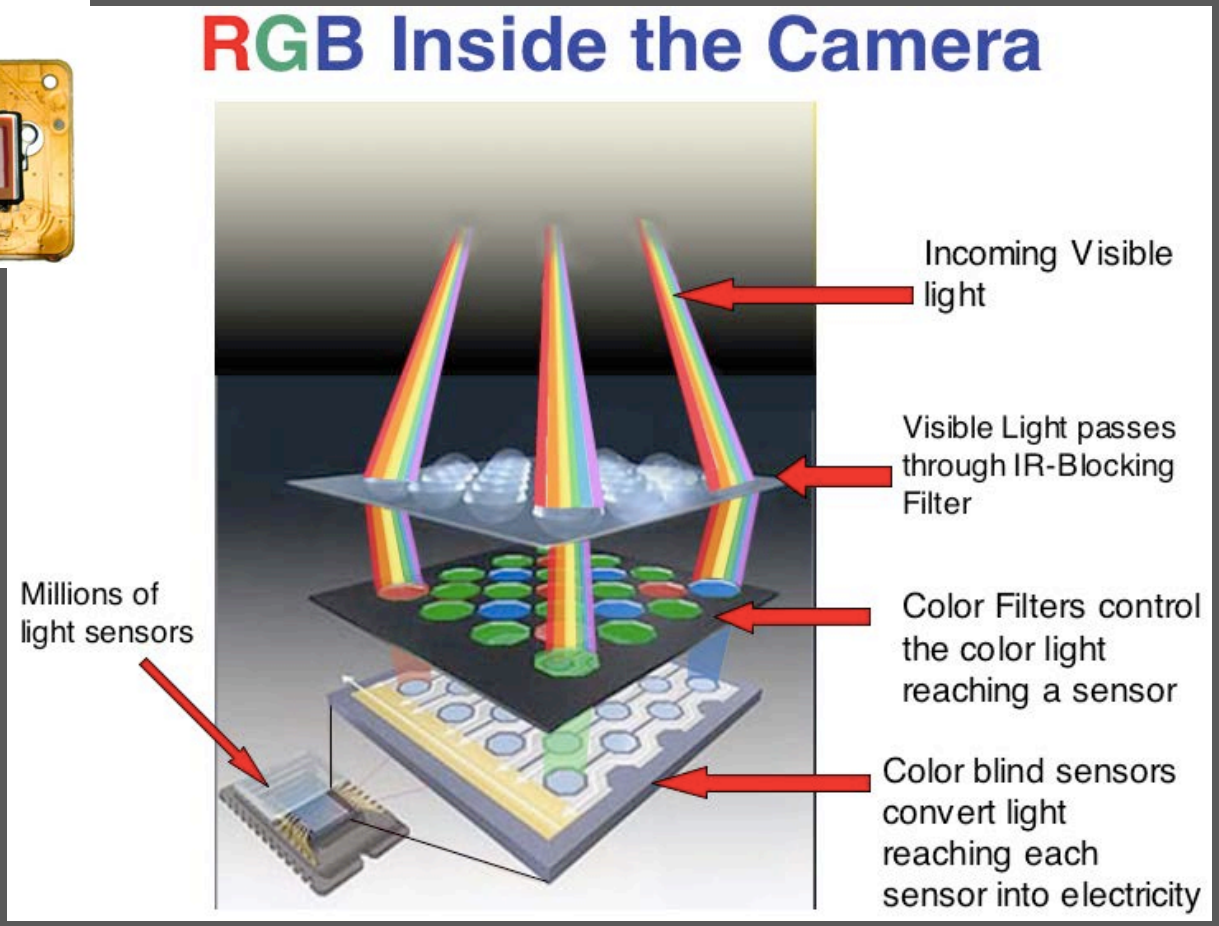
Light enters the camera and the scene is recorded with an image sensor



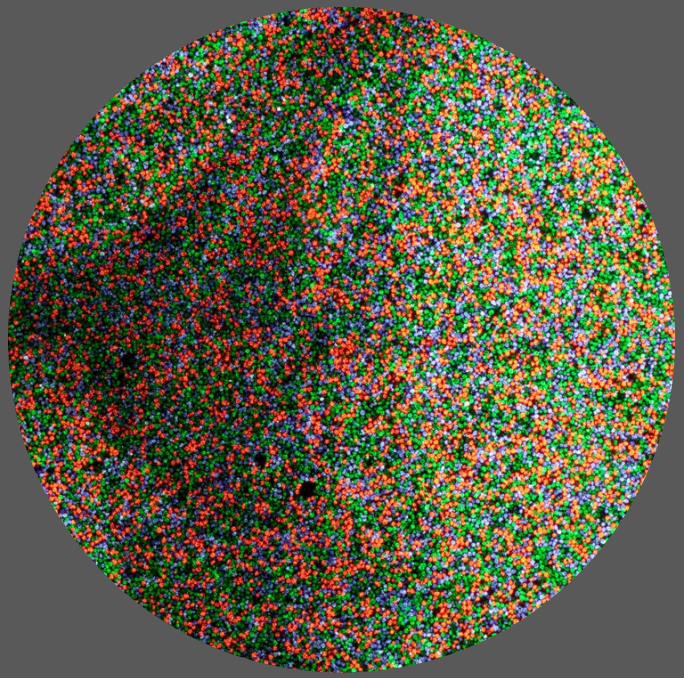
kids.britannica.com

Digital Imaging Technology





Autochrome Screen Plate



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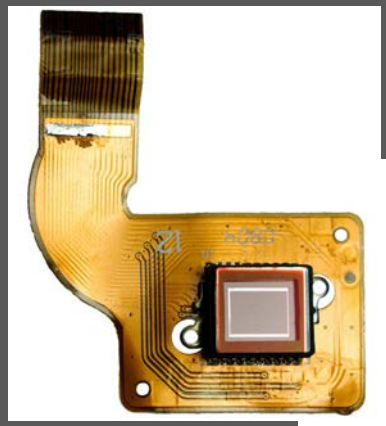
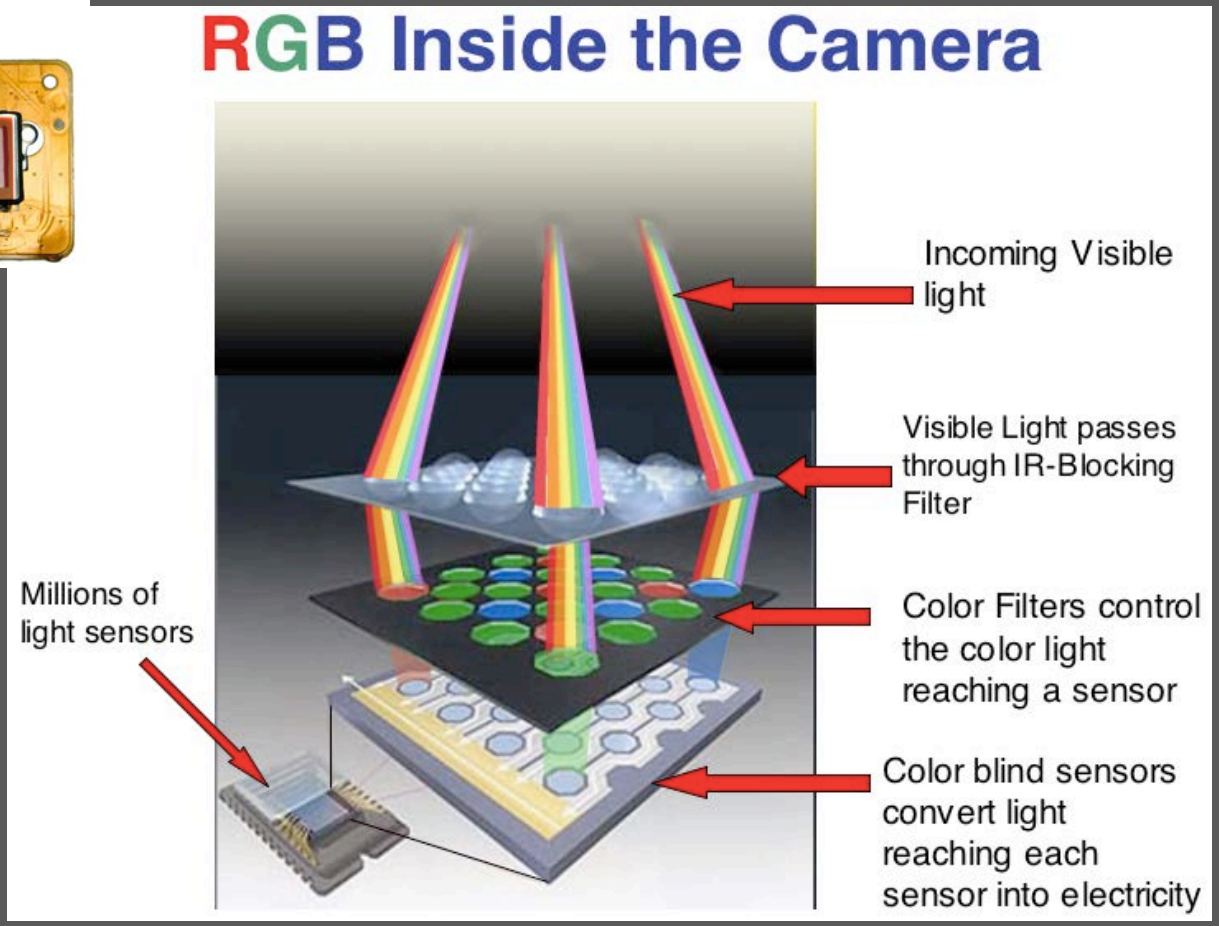
Digital Imaging Technology





Digital Imaging Technology

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Image from digital camera

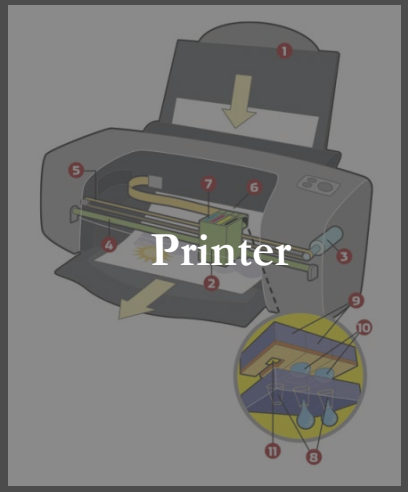
Silver halide
negative/positive material

Direct Input

Scanner

Computer

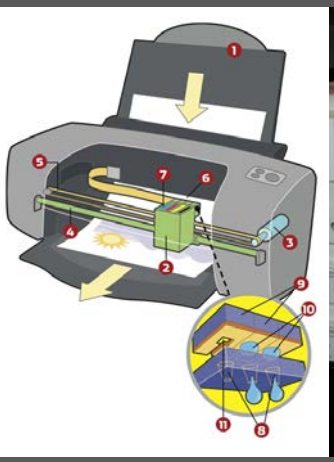
Printer



Digitally Exposed Photographic Materials

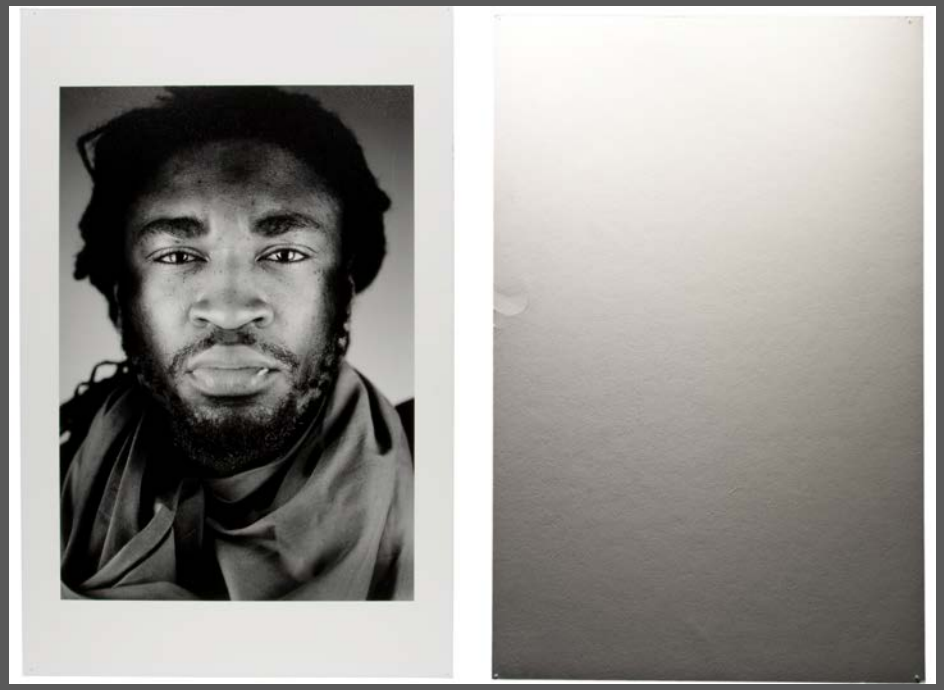
Printing Technologies

- 4 Major Kinds…for now
  - Inkjet
  - Electrophotography
  - Dye Diffusion Thermal Transfer
  - Digitally Exposed Photograhic Materials



Inkjet

- Materials
- Printing Technology



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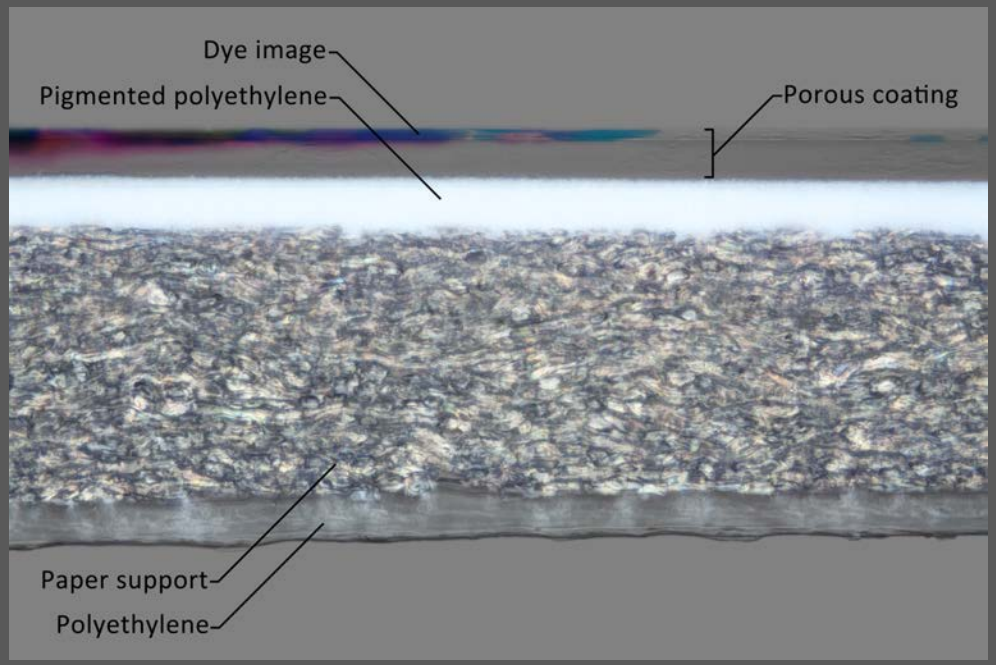
Materials: Inkjet

- Image Material (Ink)
- Ink Receiving Layer*
- Support
- Support Coating(s)*
- Additives to support, receiving layer*

*not always present



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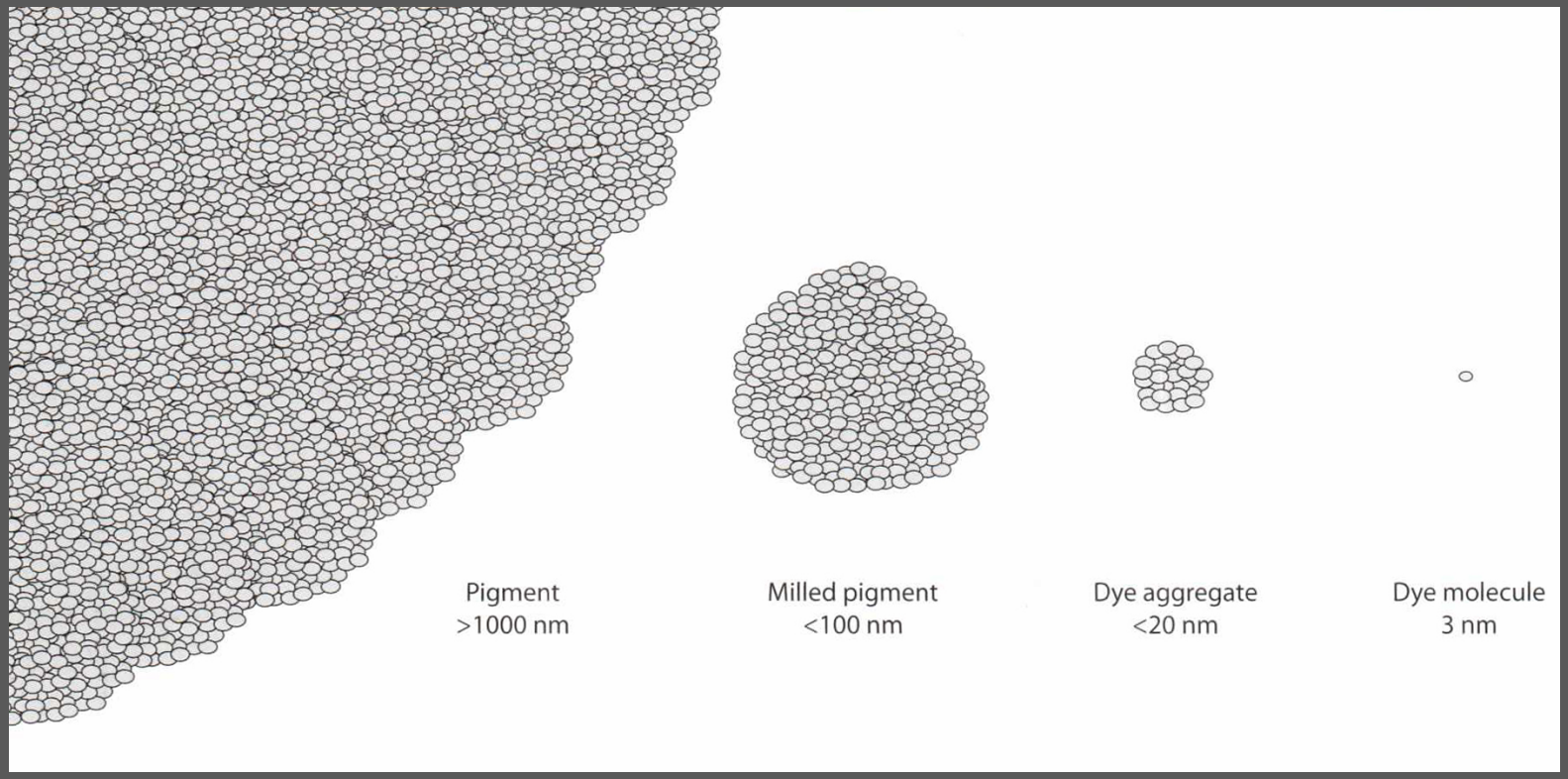
Materials: Inkjet

Ink: pigment-based or dye-based

Materials: Inkjet

Dye vs. Pigment



From Martin Jürgens, *The Digital Print, Identification and Preservation,* 2009

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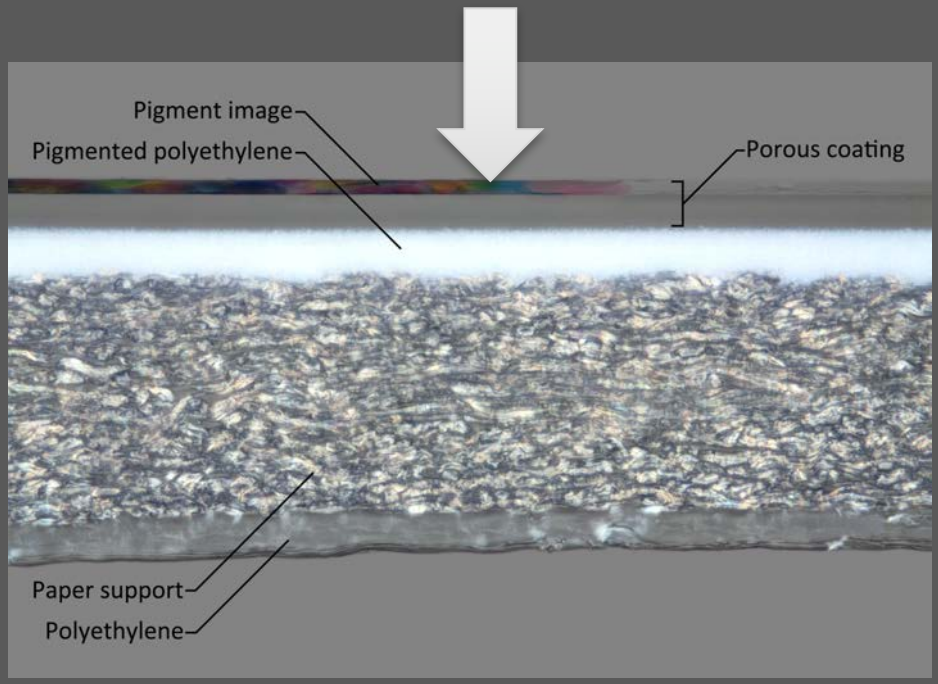
Materials: Inkjet

Supports: paper, plastic, canvas, cloth

Materials: Inkjet

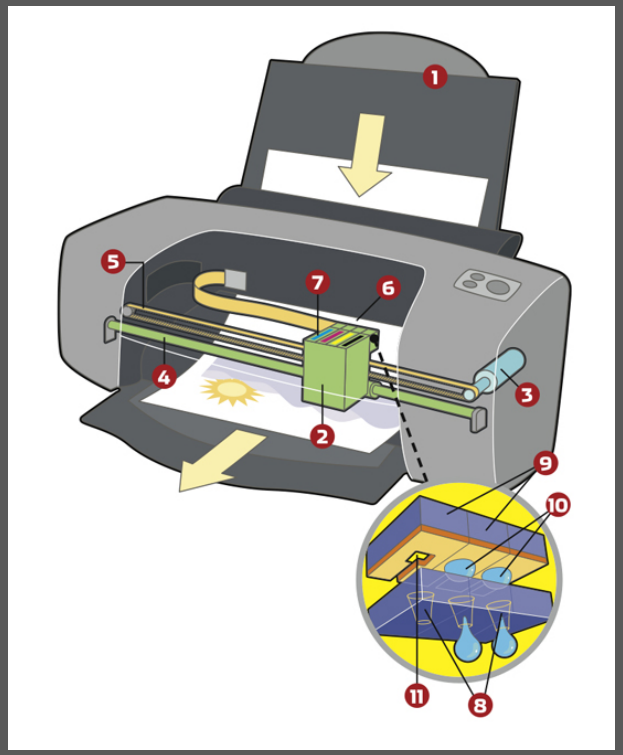
Ink Receiving Layer (IRL)

- Purpose
  - Ink absorption mechanisms act like traditional "binder" layer in photographic prints
  - Holds image material



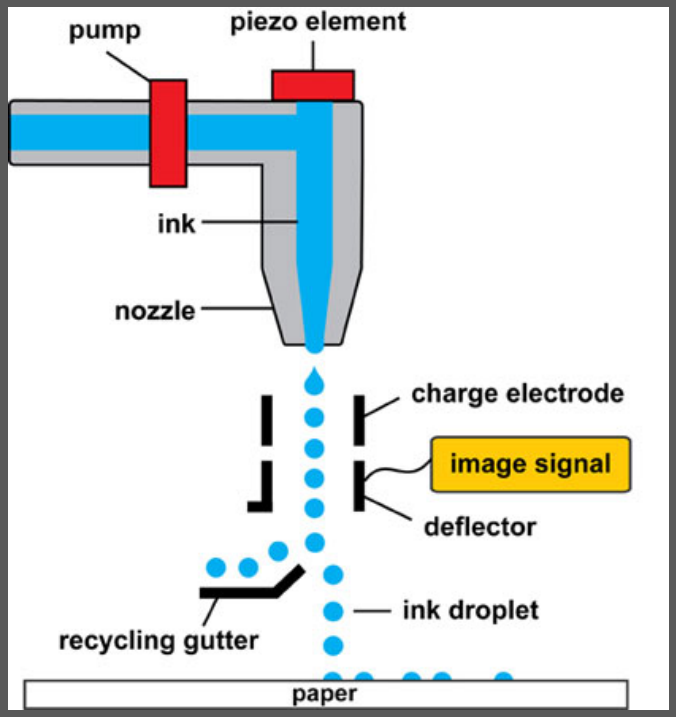
Inkjet

Ink is ejected from the nozzle onto substrate

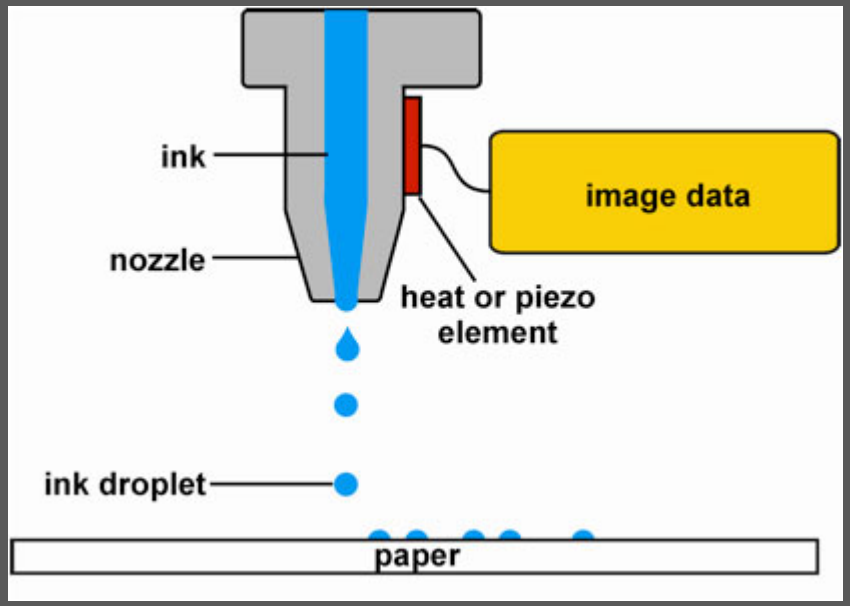


Inkjet

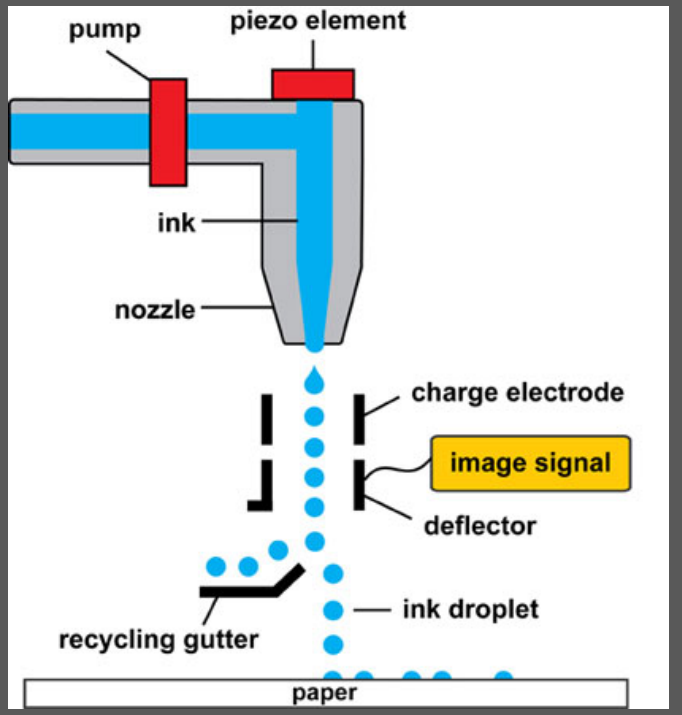
Continuous Inkjet



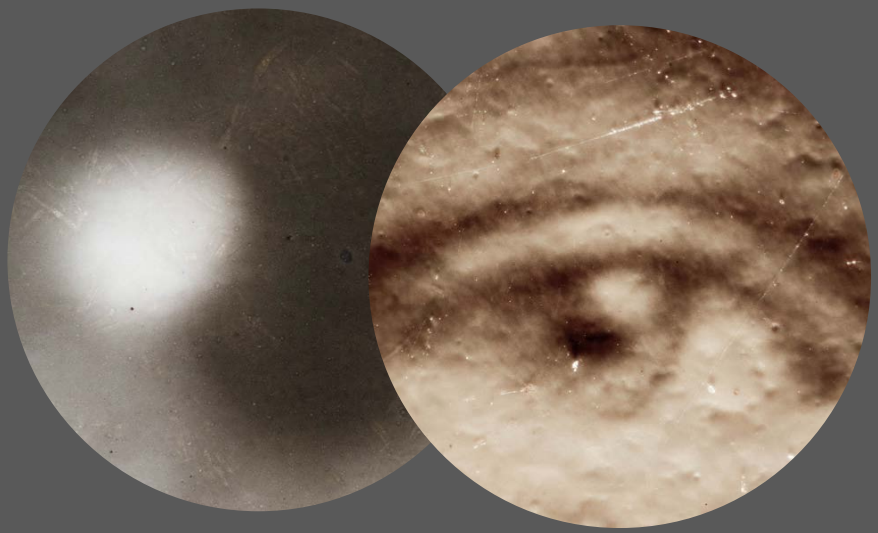
Drop on Demand



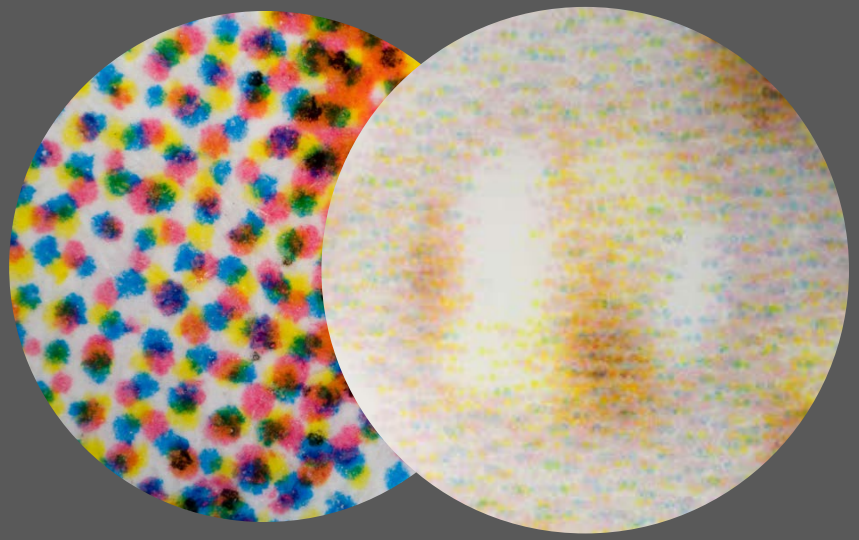
Continuous Inkjet



Continuous in Tone vs Patterned



Photographic
Continuous in tone



Photomechanical or Digital
Patterned

50x magnification

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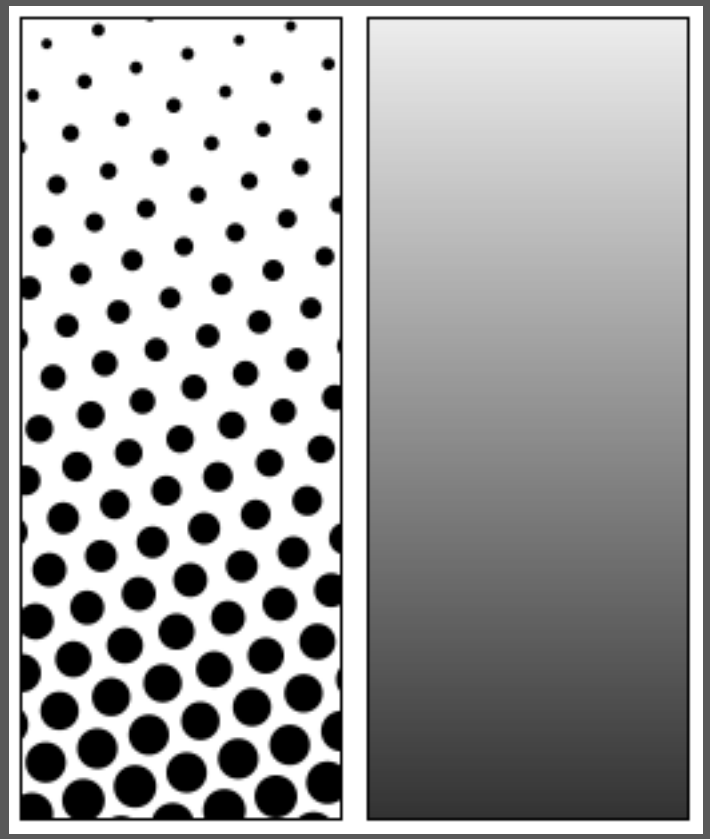
Halftone Reproduction

- Halftone – tone is created by varying the white space between maximum density spots
- This reproduction relies on a basic optical illusion…that these tiny halftone dots are blended into smooth tones by the human eye



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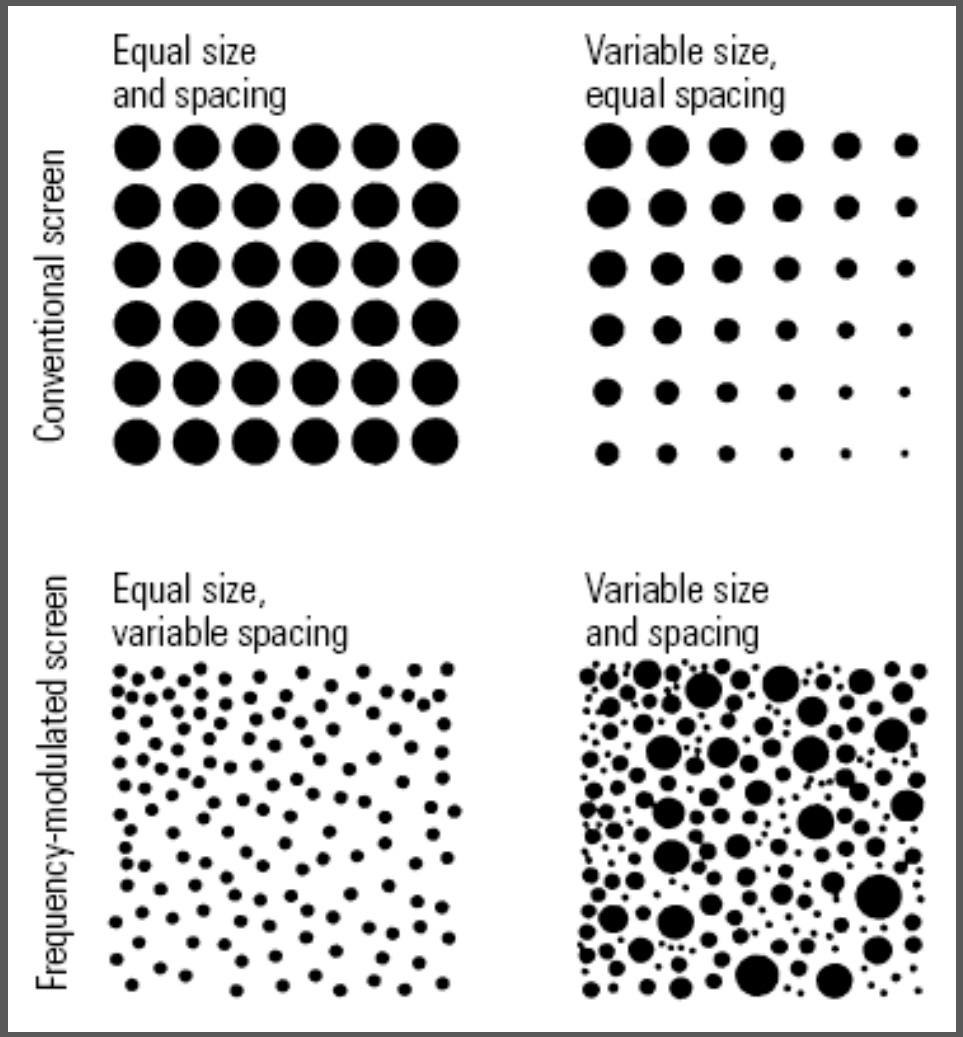
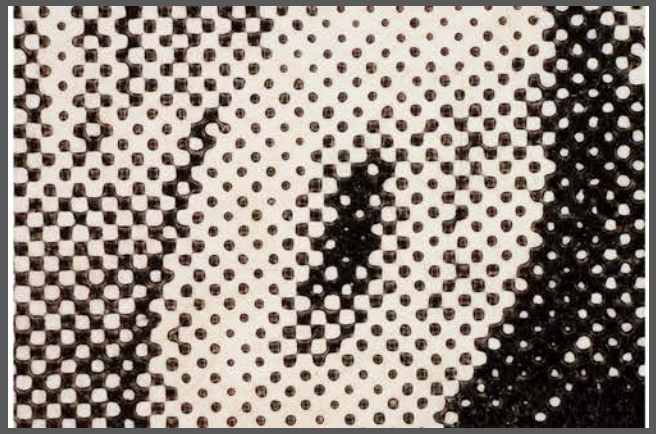
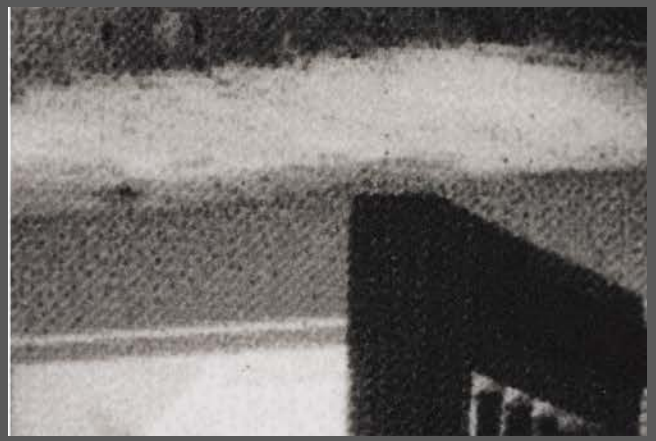
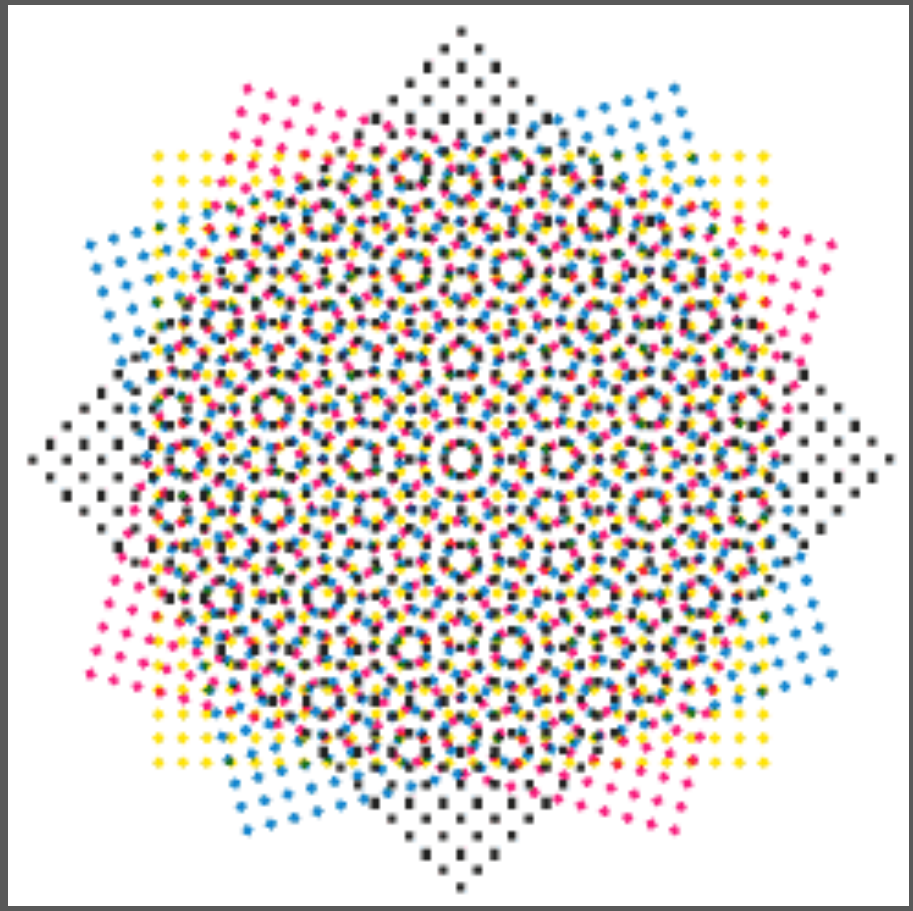
Halftone: AM and FM Screen







AM Screen: Color



scottishprintarchive.org

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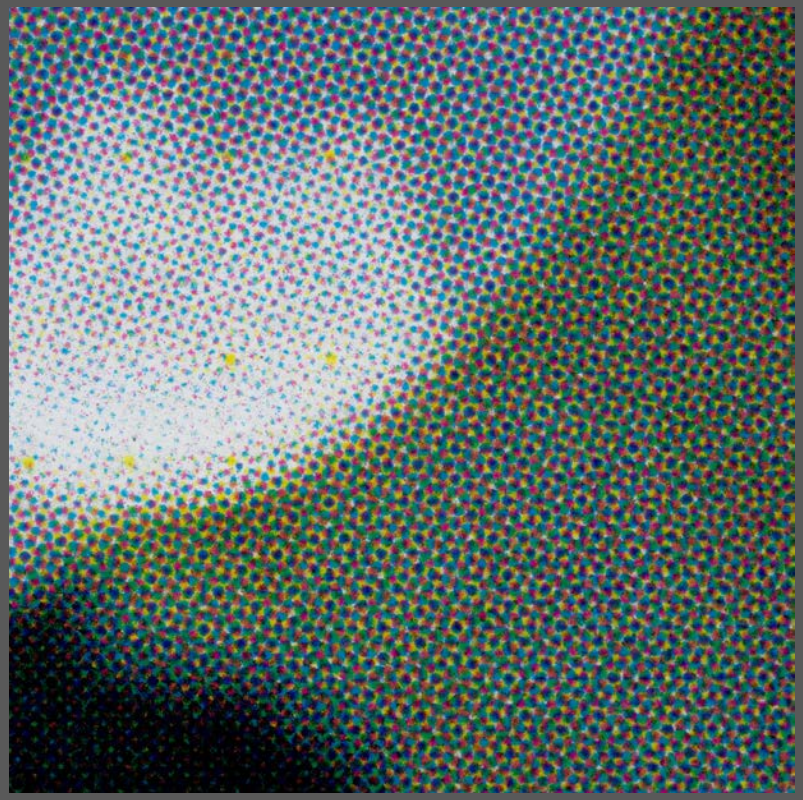
Halftone Screens

AM



10x magnification

FM

10x magnification

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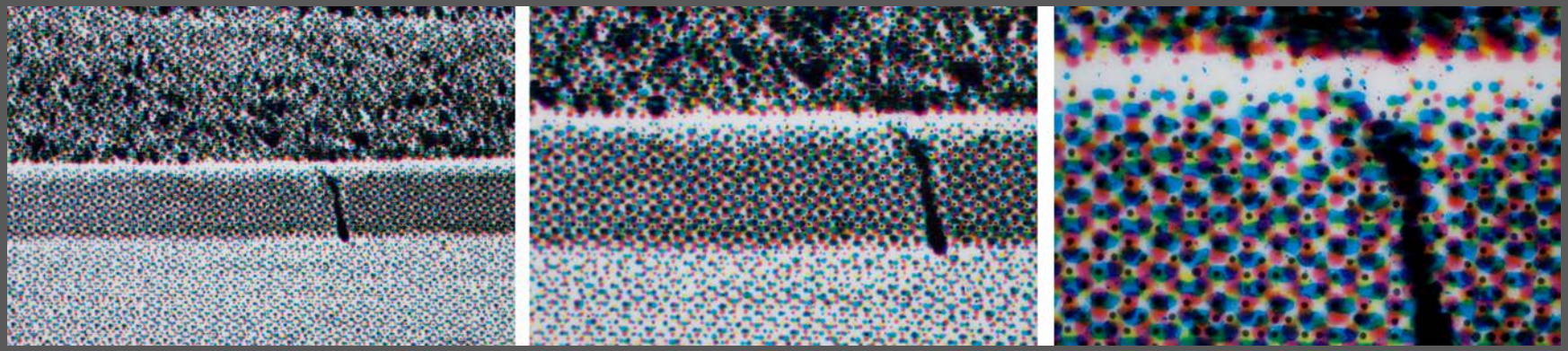
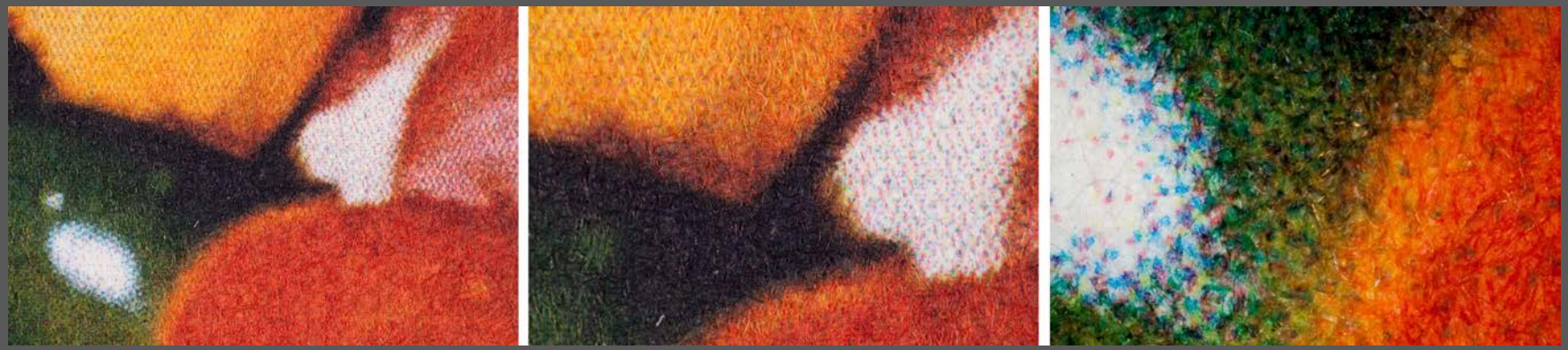
Continuous Inkjet



Coated Paper

Uncoated Paper



10x

30x

50x

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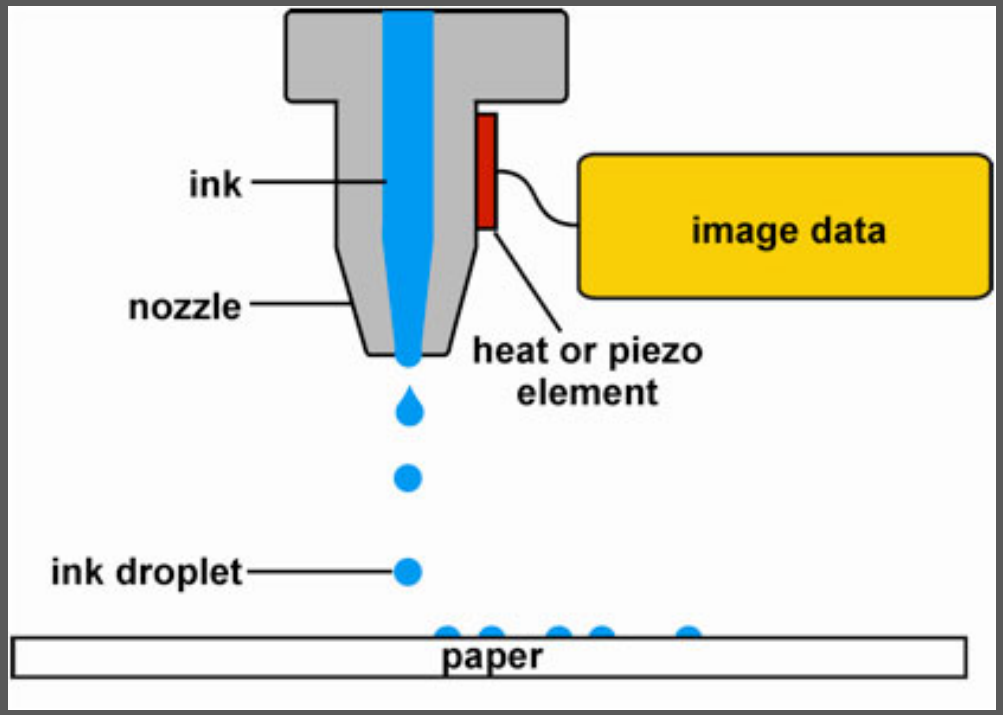
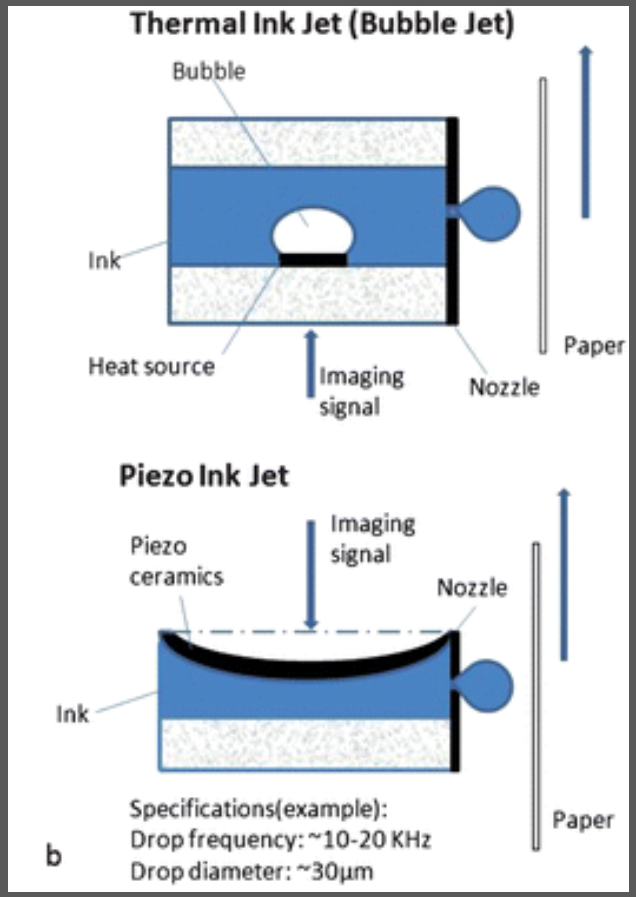
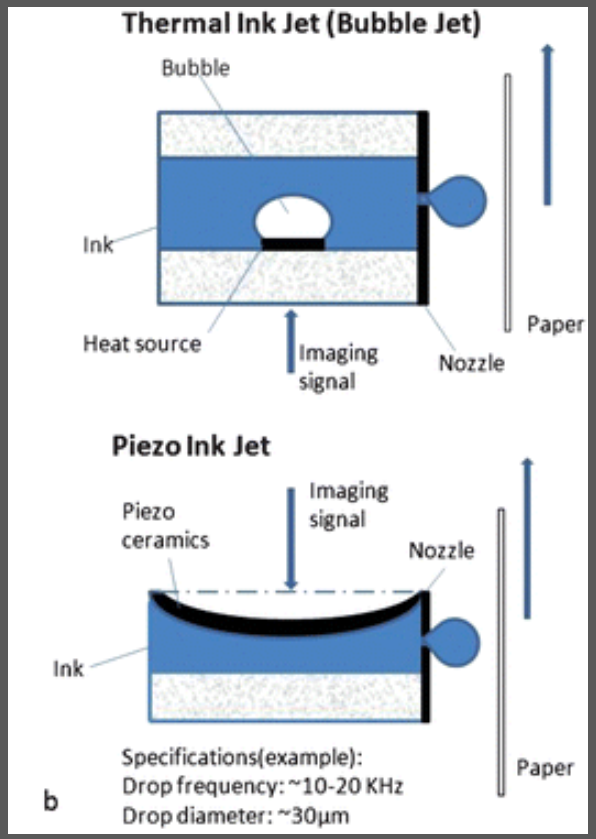
Drop On Demand (DOD)





Drop On Demand (DOD)



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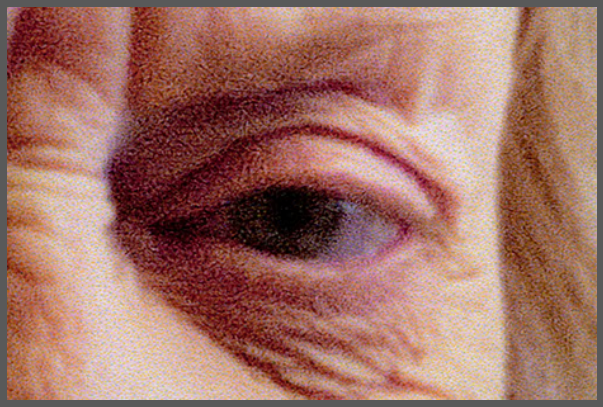
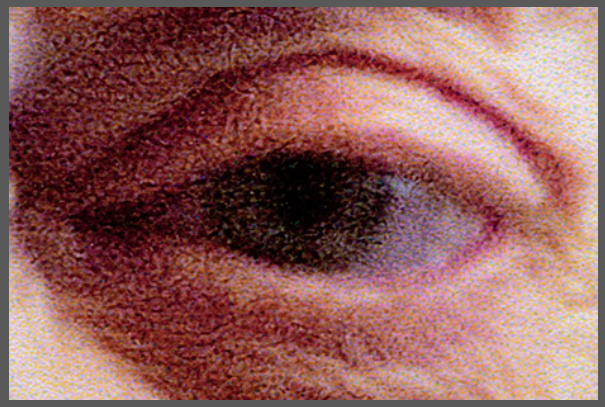
Drop On Demand (DOD)

FM Screen



10x



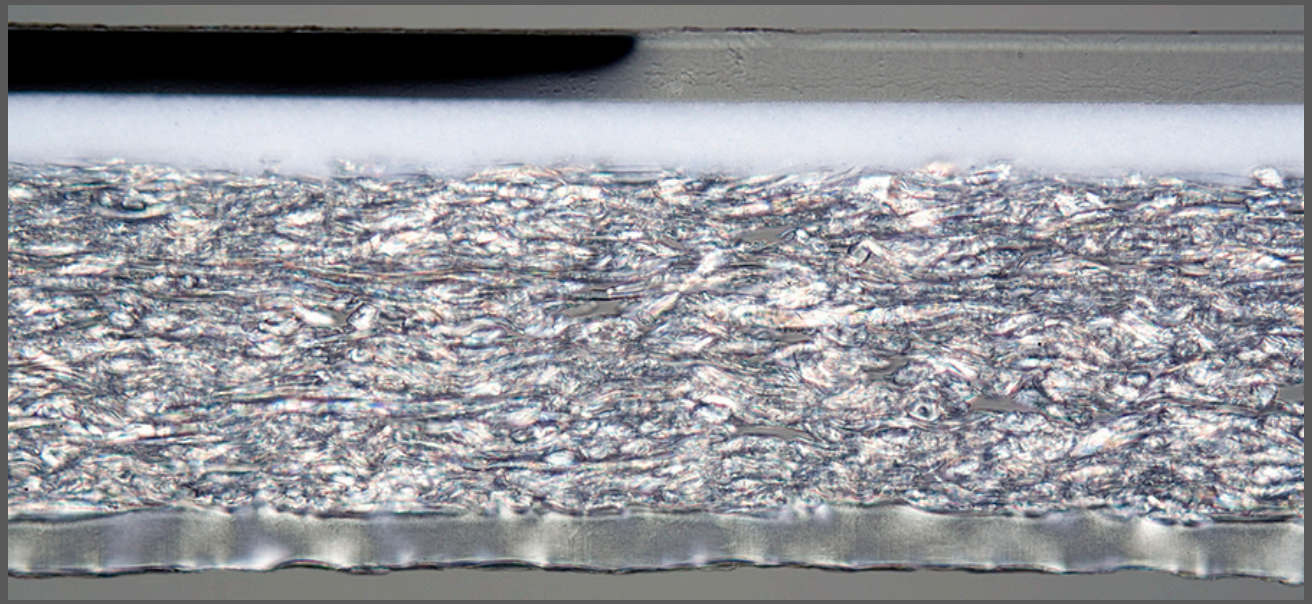
30x

50x

Materials: Inkjet

Swellable/Polymer Ink Receiving Layer

- Layer swells when in contact with ink
- Layer shrinks when drying
- Slow drying
- Worked best with dye-based inks



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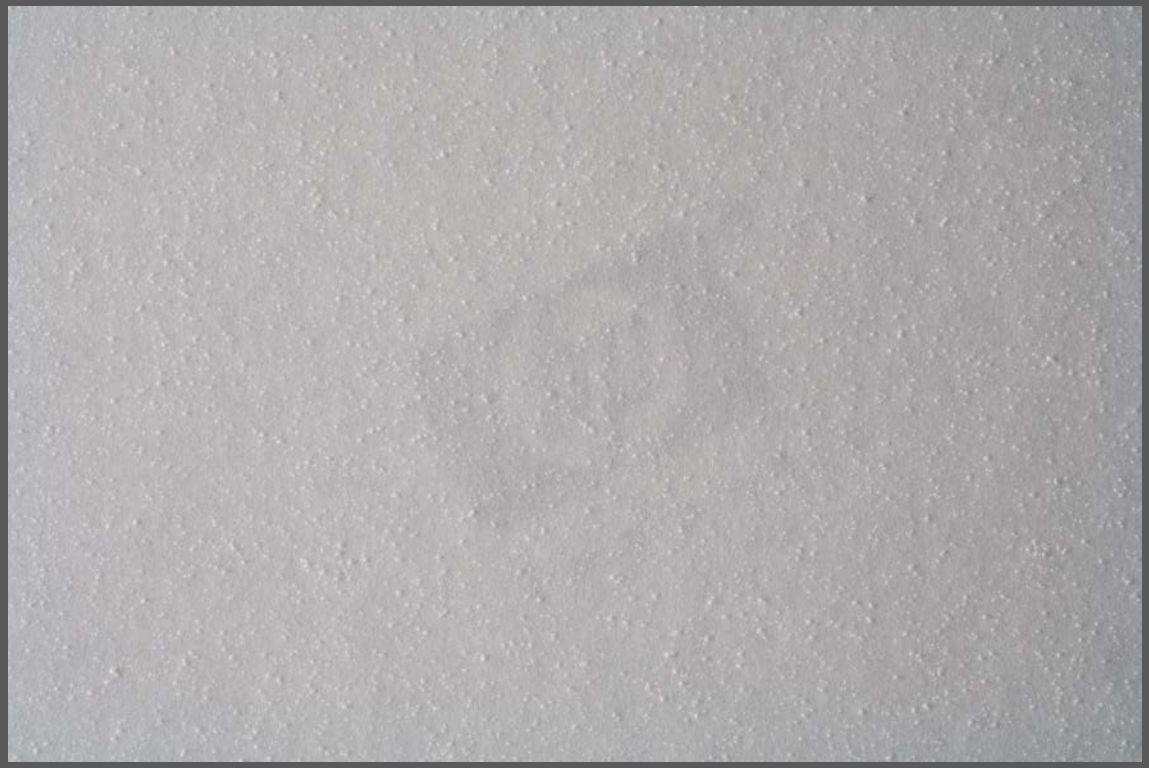
Materials: Inkjet

Swellable/Polymer

- Anti-blocking
- Back feels like sandpaper



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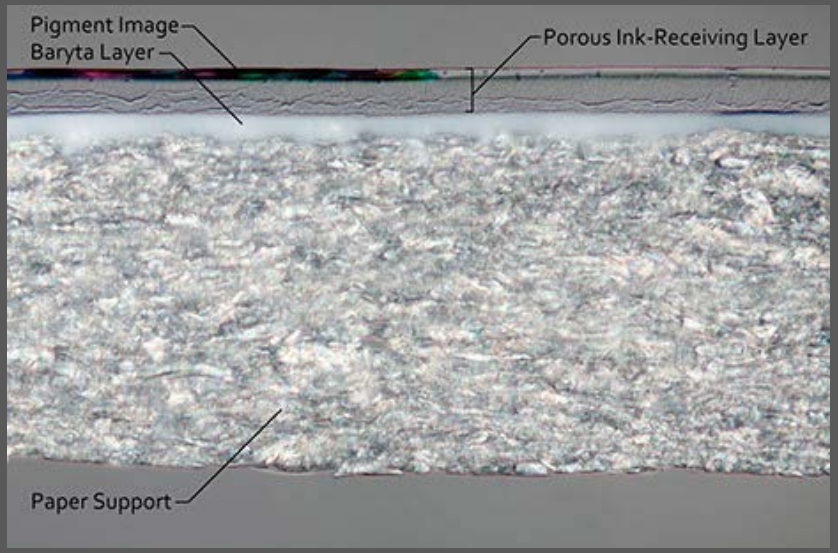
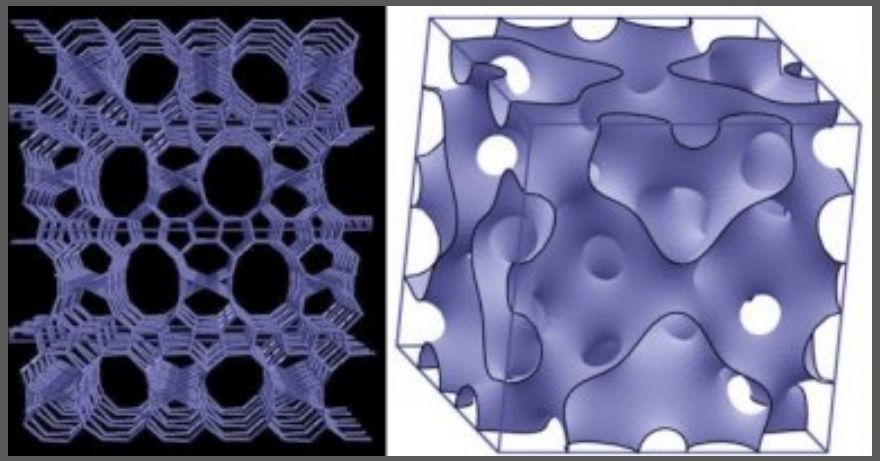
Materials: Inkjet

Porous/Mineral Ink Receiving Layer

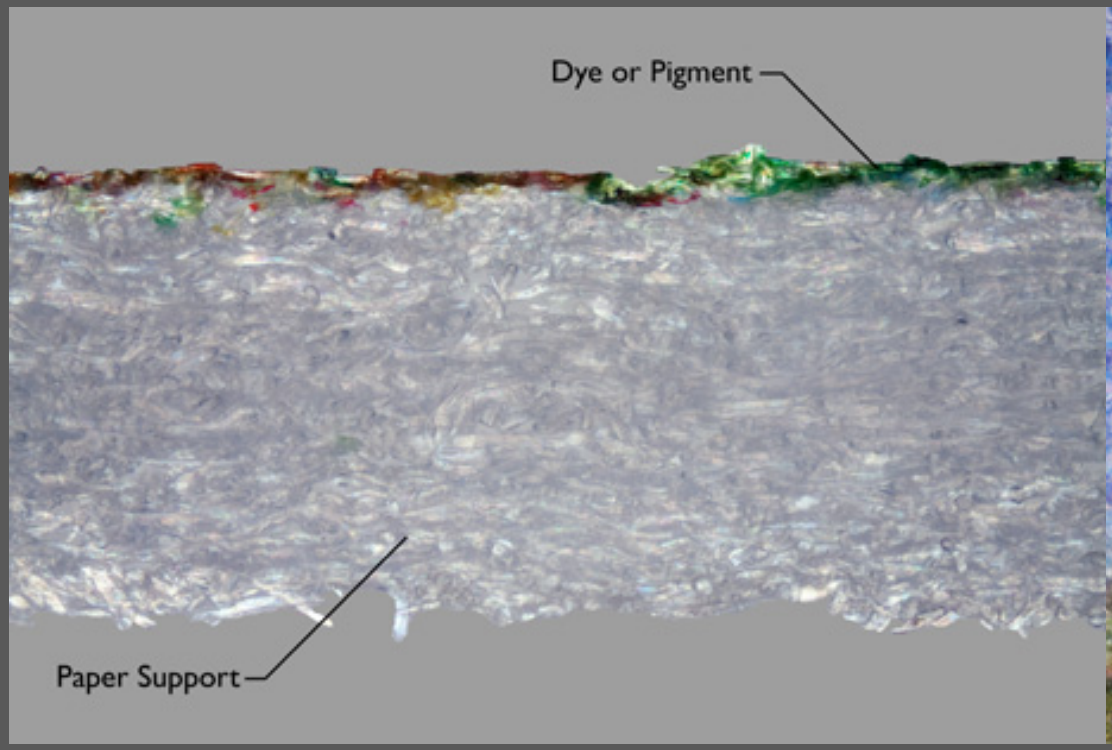
- Like a sponge
- Various components
- Layer does not swell
- Very fast drying
- Dye-based or pigment-based inks

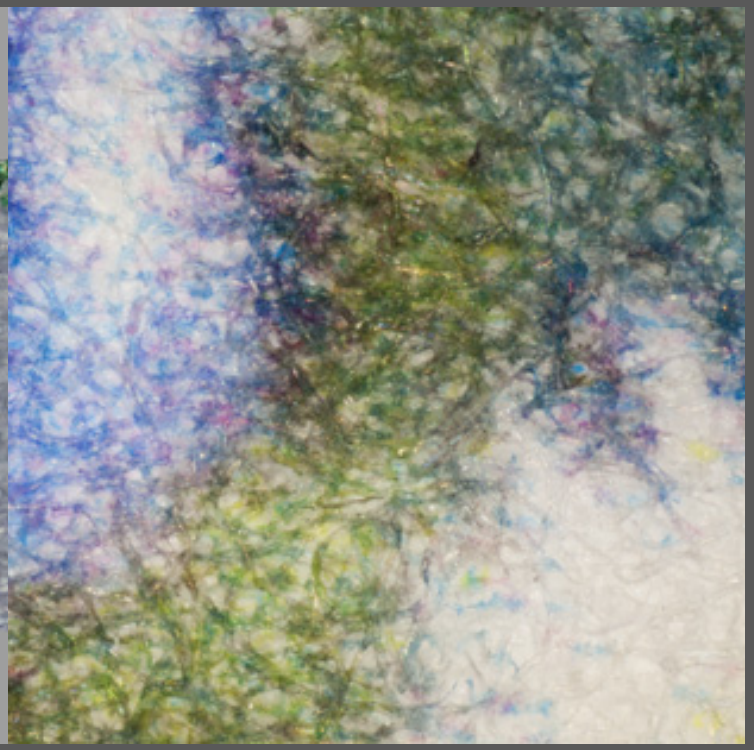




Materials: Inkjet

One Layer: Ink on Paper





Inkjet, Uncoated Fine Art Paper

50x

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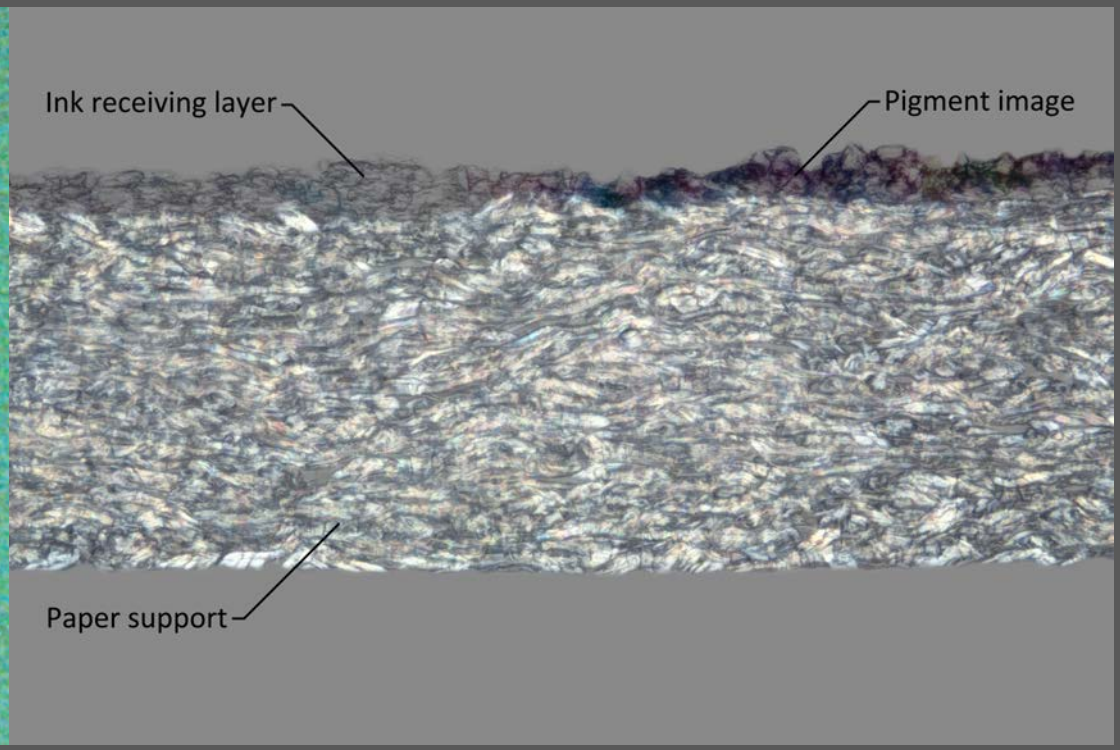
Materials: Inkjet

Two Layers: Ink in IRL on Paper



30x

Inkjet, Porous IRL on Paper

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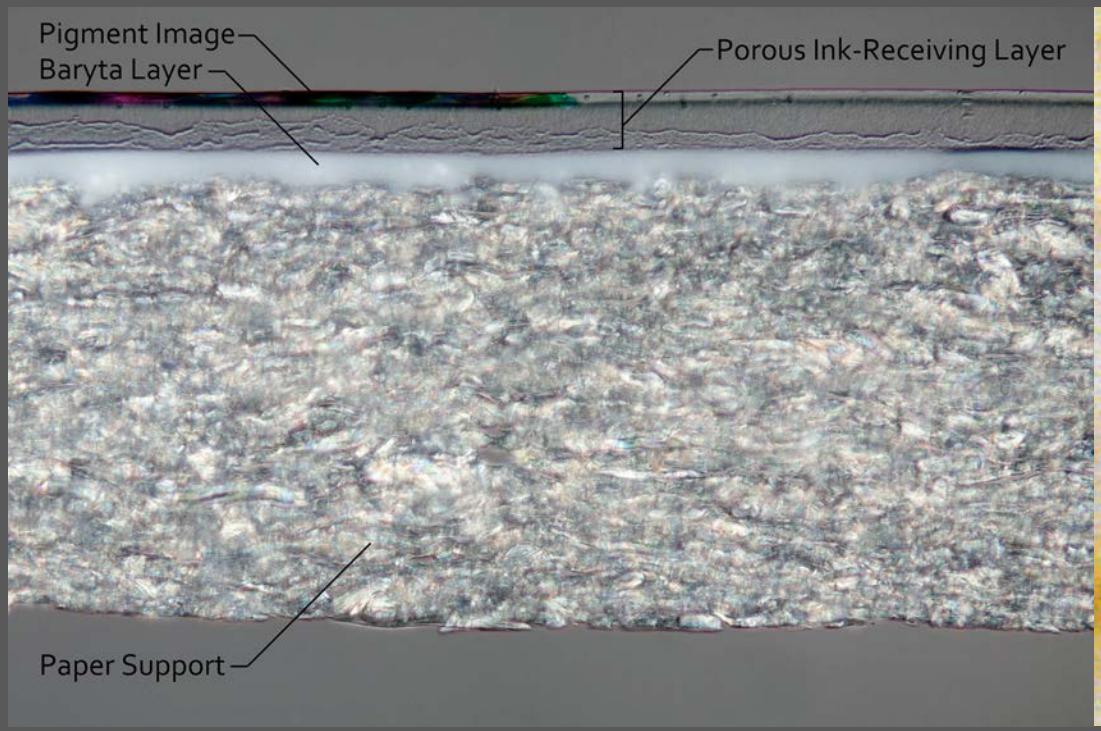
Materials: Inkjet

Three Layers: Ink in IRL on Coated Paper



Inkjet, Pigment on Baryta Paper

30x

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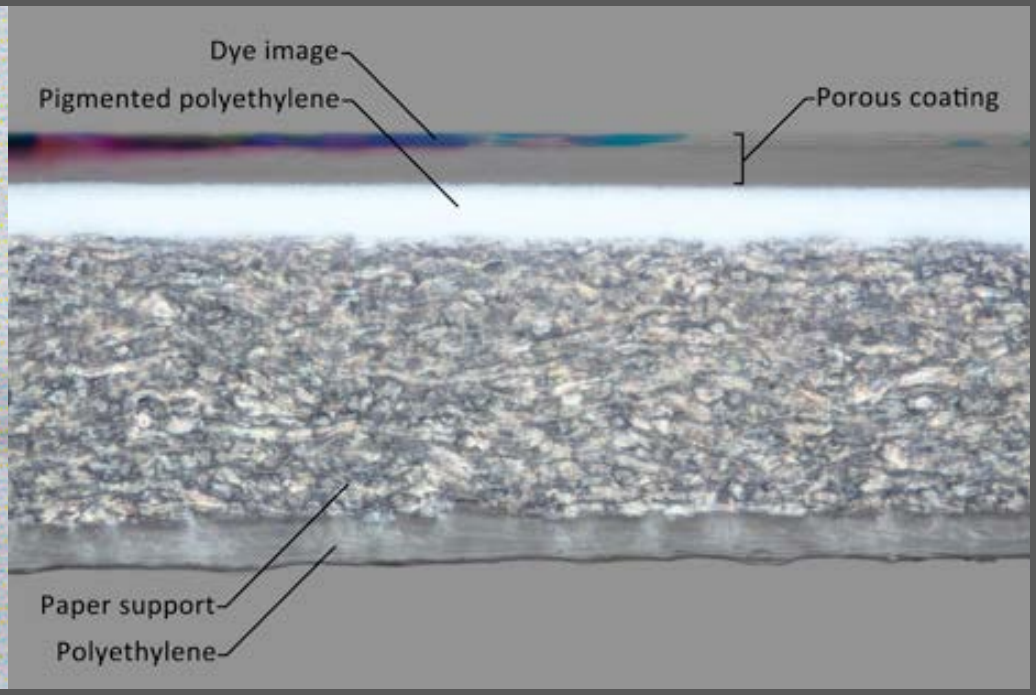
Materials: Inkjet

Three or More Layers: Ink in IRL on Resin Coated Paper



30x

Inkjet, Dye on RC Paper

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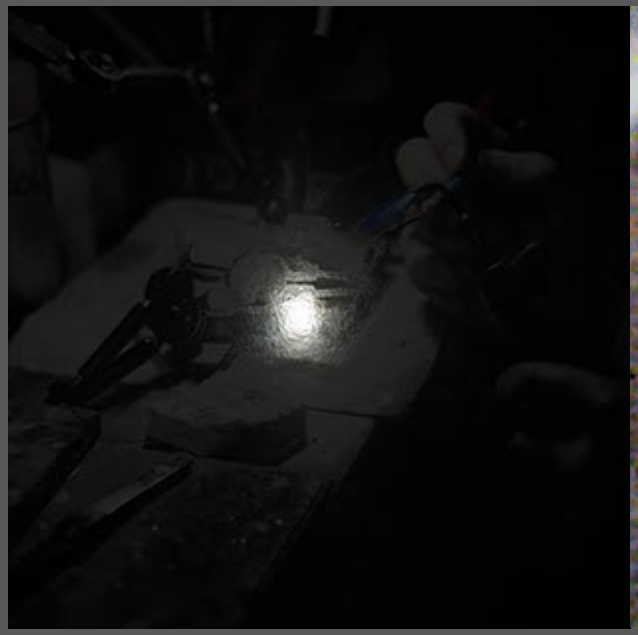

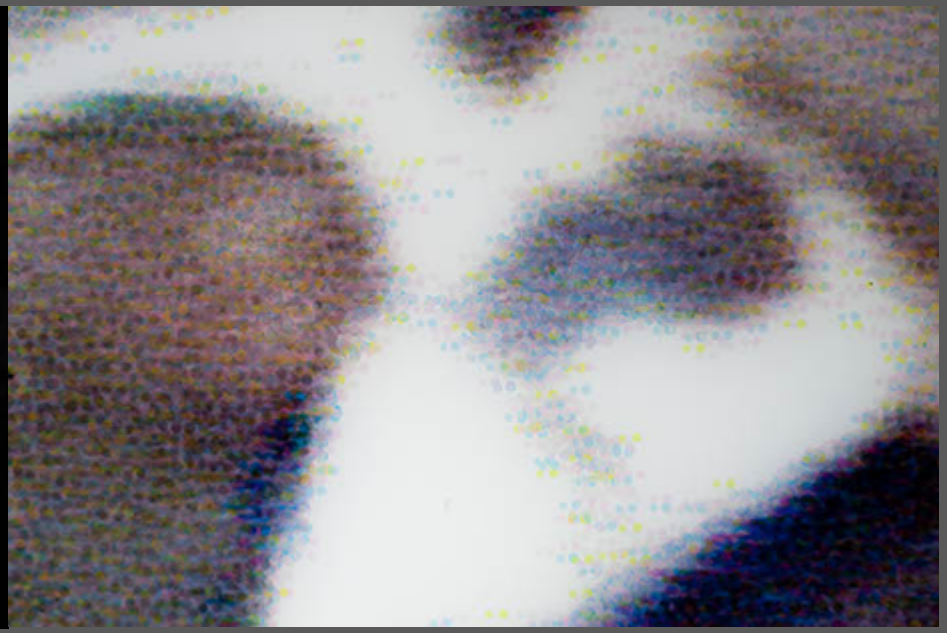

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Materials: Inkjet



Pigment inks on glossy paper

- Differential Gloss
- Bronzing


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Materials: Inkjet

Optical Brightening Agents

Fluoresce blue with UV light

Inkjet ID Summary

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Inkjet ID Summary

Random dots (FM Screen), varying sharpness depending on the support

Pigment-based inks on glossy paper may have differential gloss and/or bronzing

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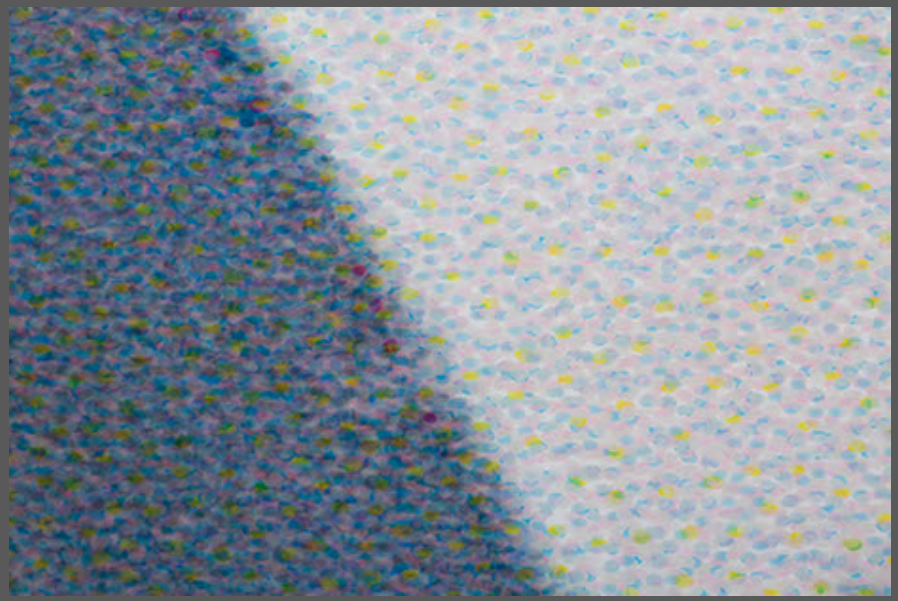
Inkjet vs Chromogenic

Inkjet, 50x



Chromogenic, 50x

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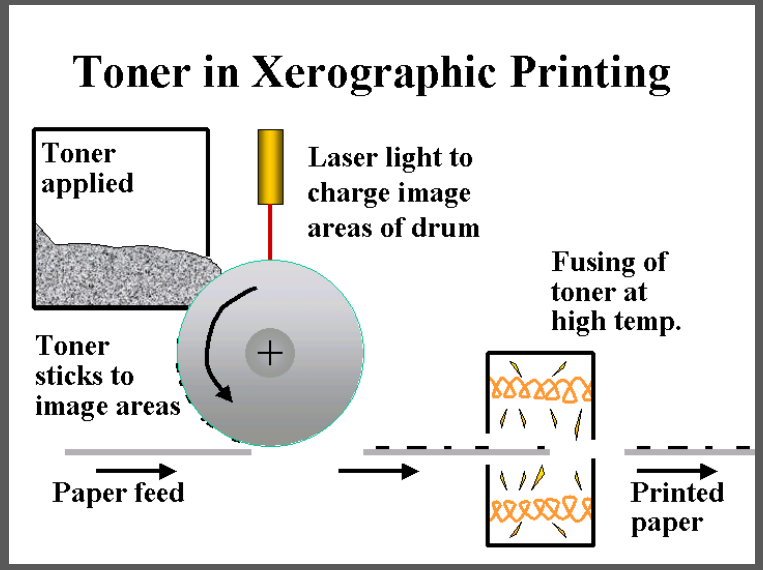
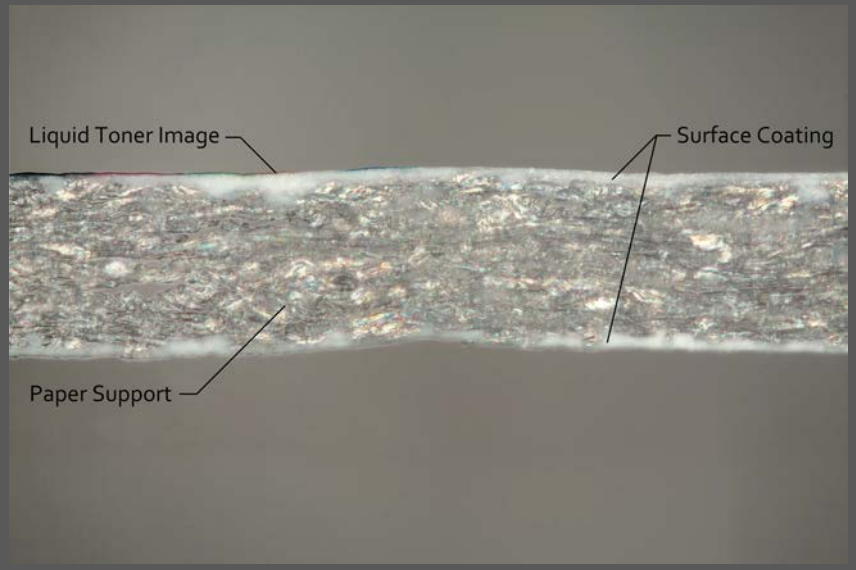
Electrophotography (EP)

- Materials
- Printing Technology

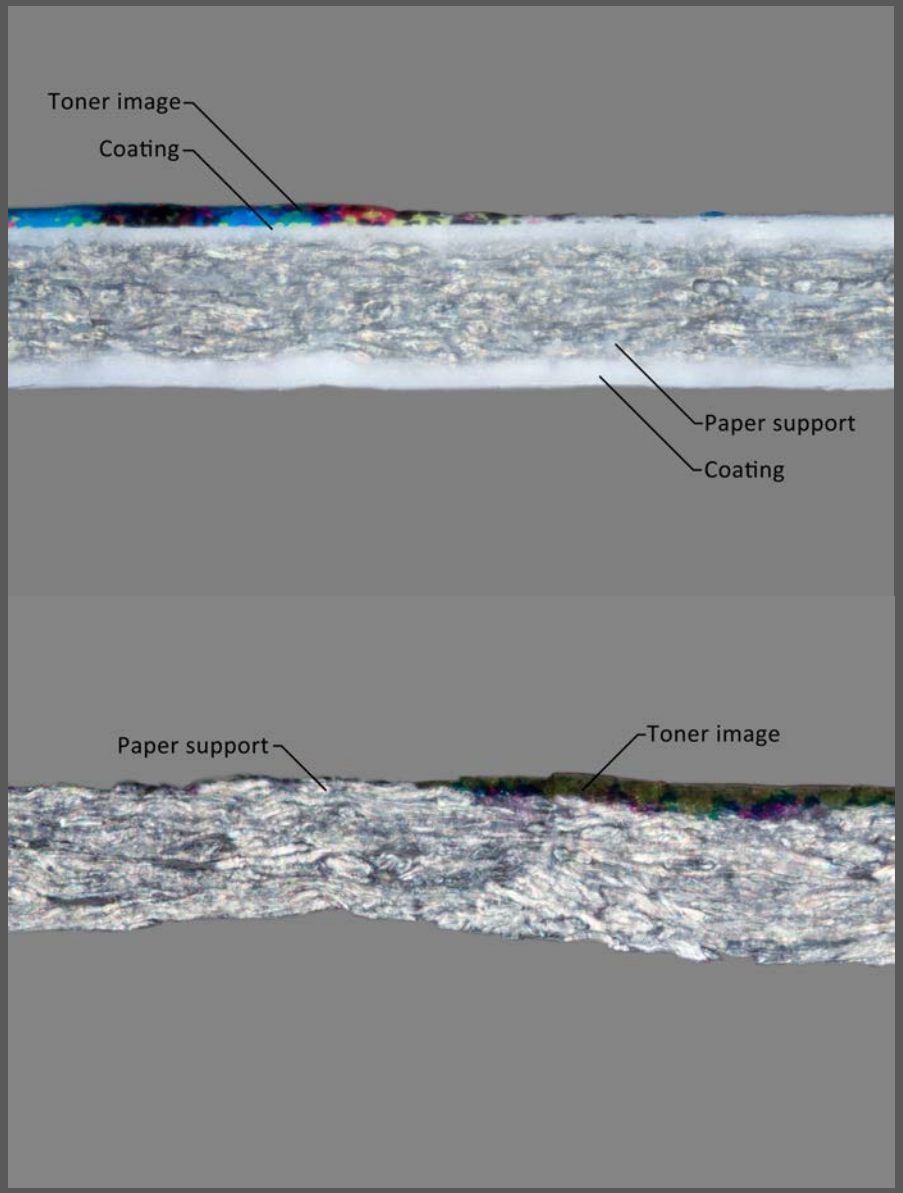




Materials: EP

- Image Material
- Support
- Support Coating(s)*

*not always present



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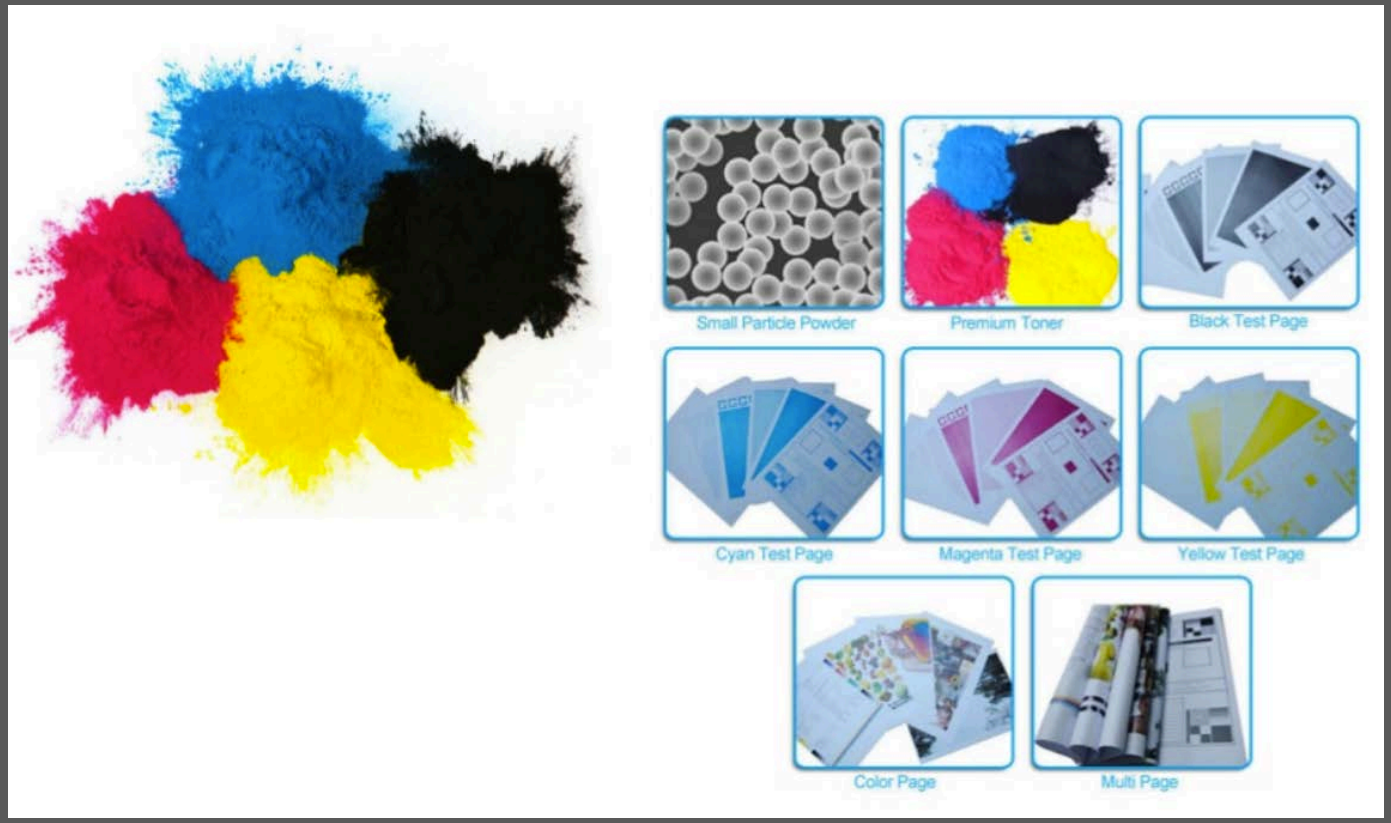
Materials: EP



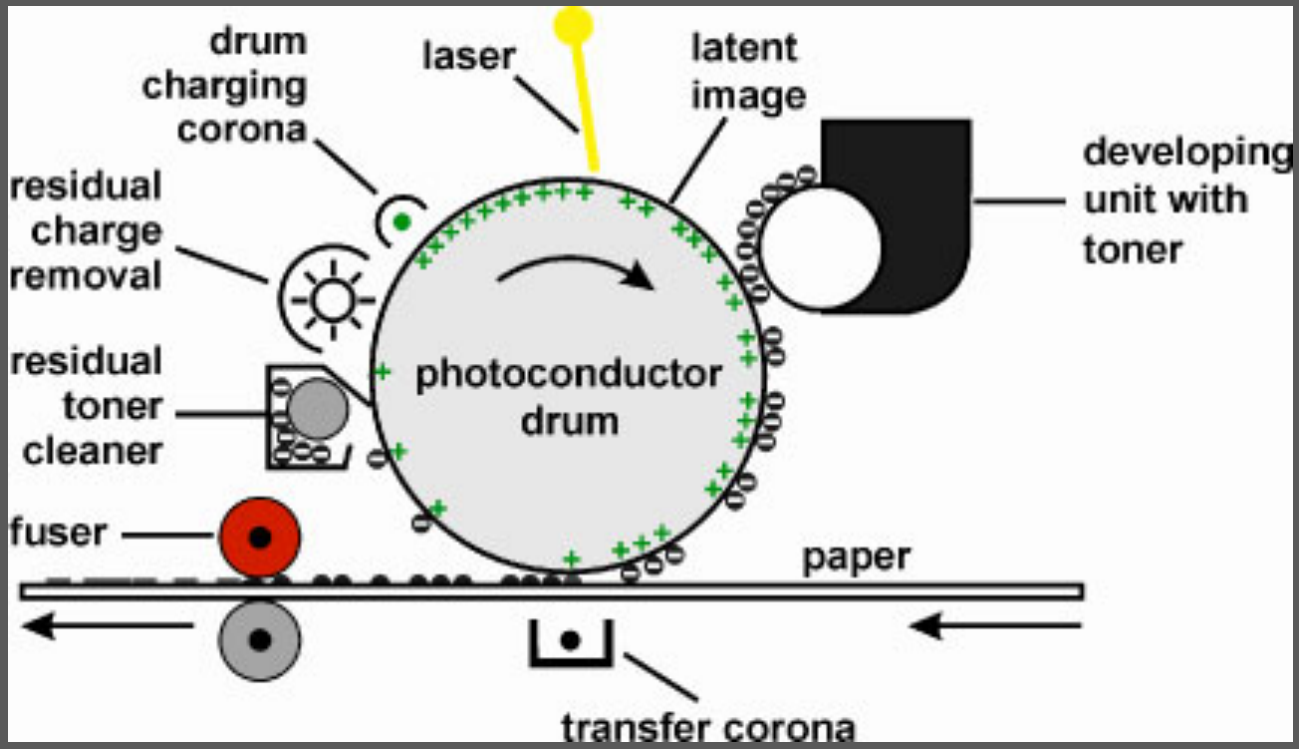
Toner: Pigment in thermoplastic resin

Materials: EP

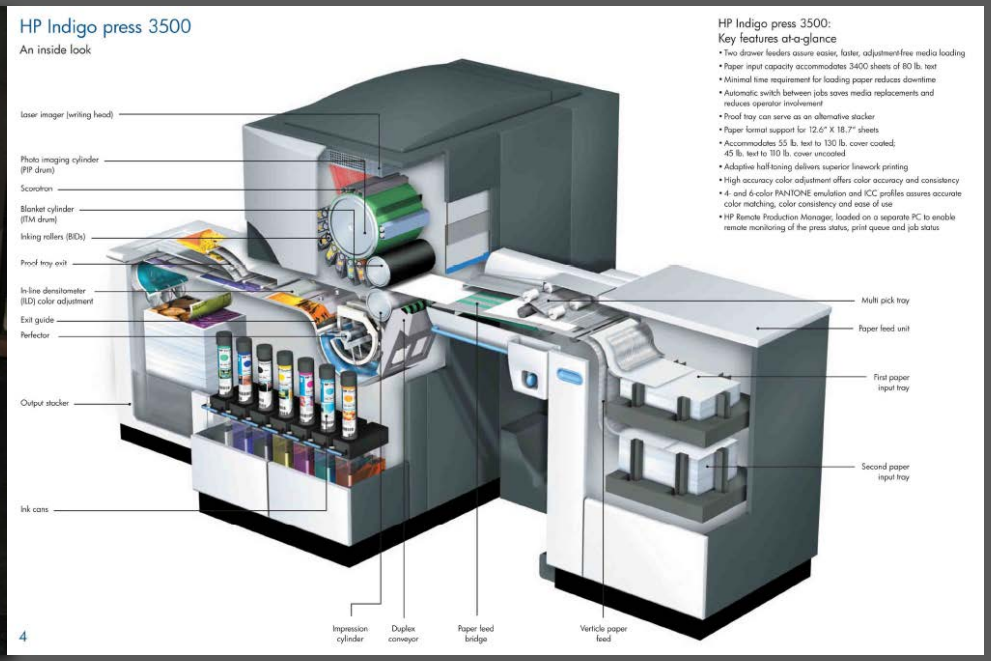
Supports: paper, plastic

Electrophotography

Toner is heat fused to the substrate



Electrophotography



Color laser printer
- Office printing
- Art (sometimes)

Digital Press
- Print on Demand
  - Books, Art Reproductions, etc.
- Magazines
- Packaging
- And More!

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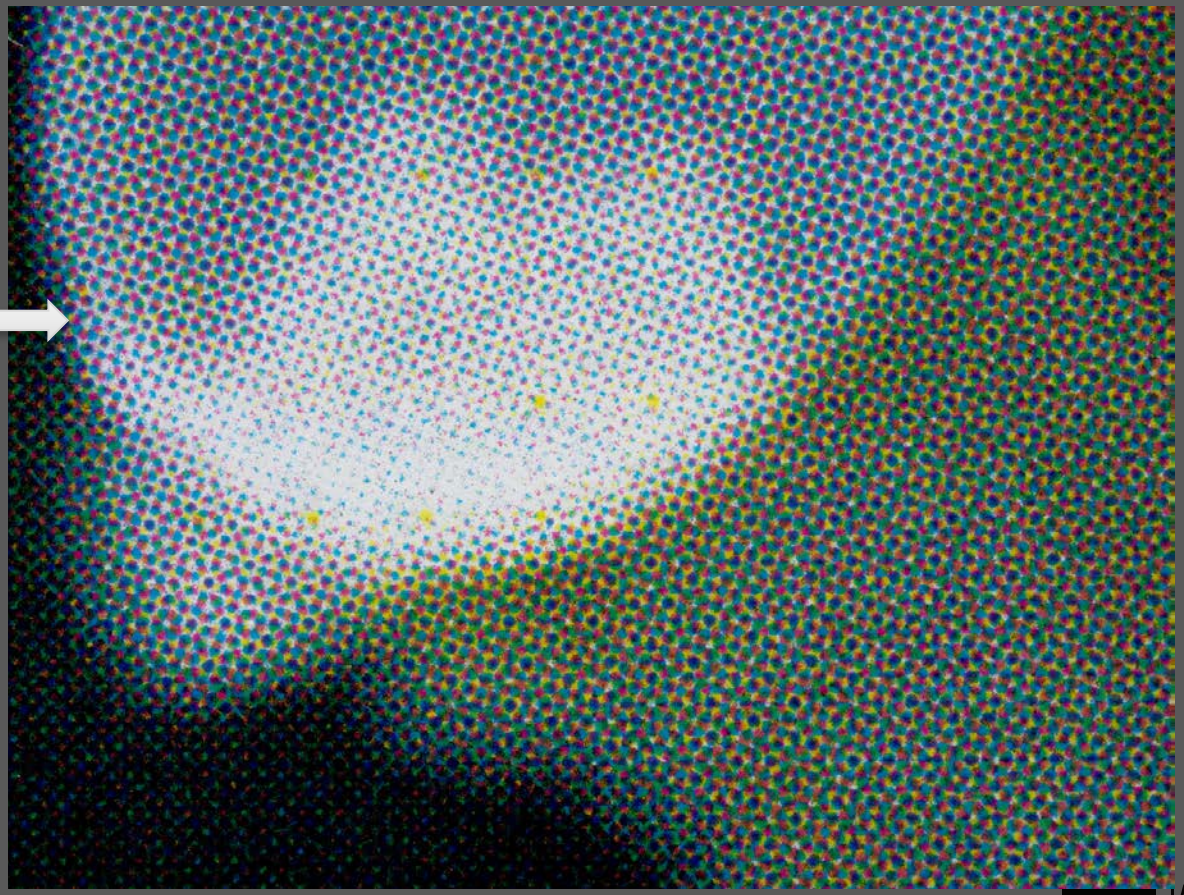
Electrophotography

http://www.coca-cola.co.uk/stories/share-a-coke

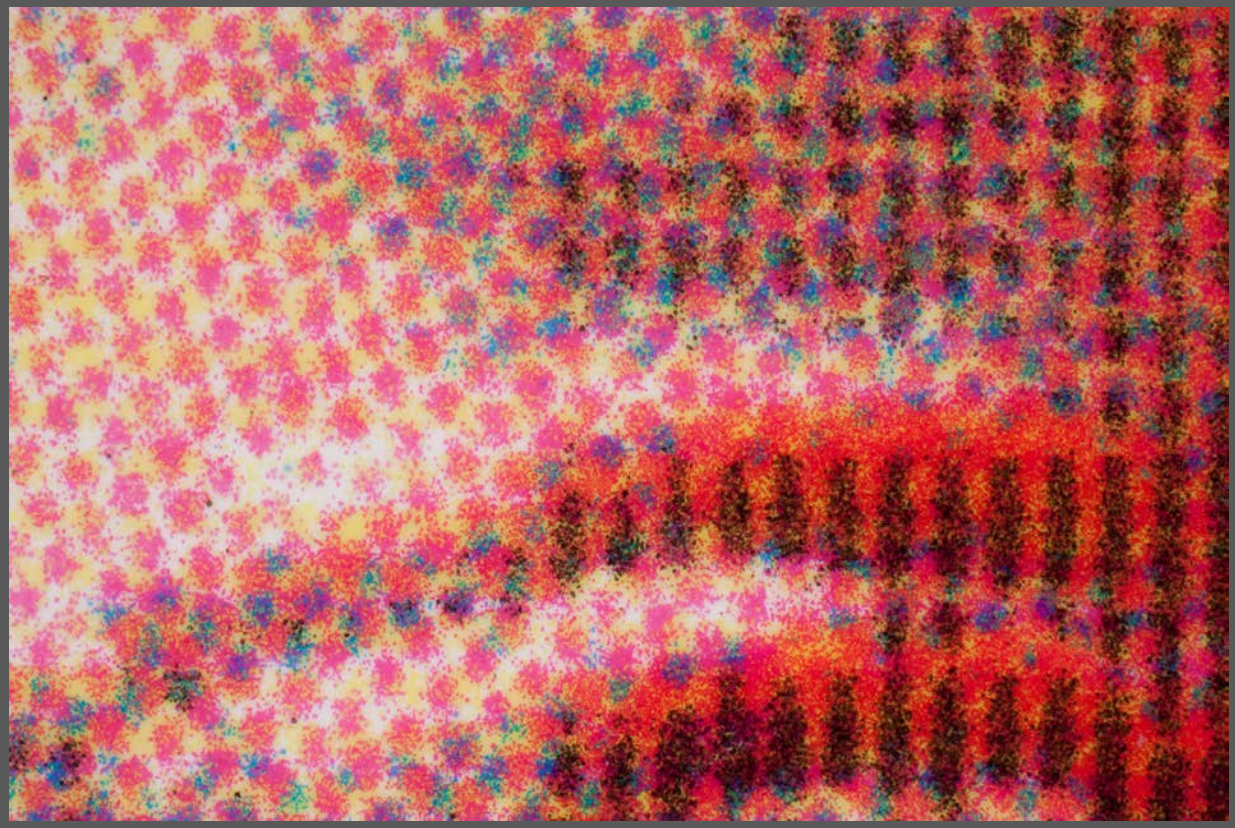
Electrophotography

AM Screen



10x

Materials: EP



50x

Dry Toner: halftone dots composed of many smaller dots (toner particles)

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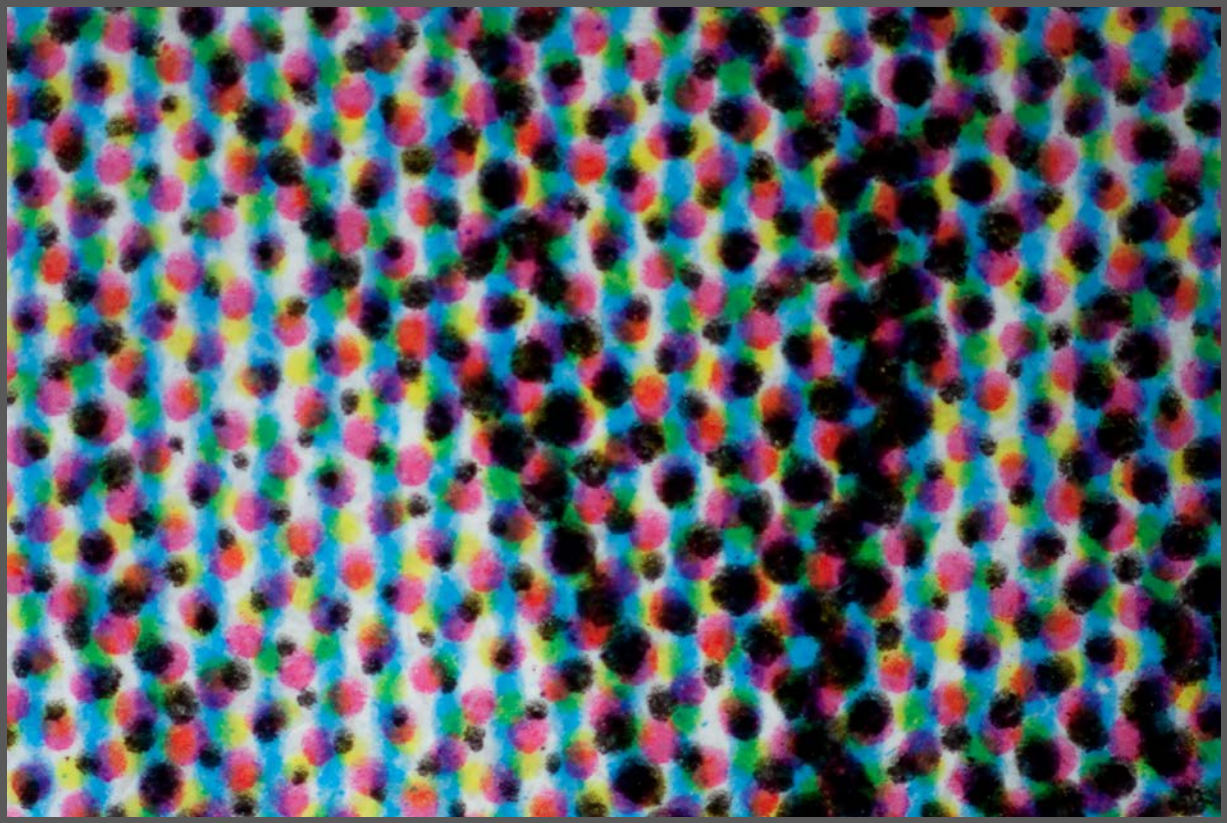
Materials: EP



50x

Liquid Toner: halftone dots have sharp edges

EP ID Summary

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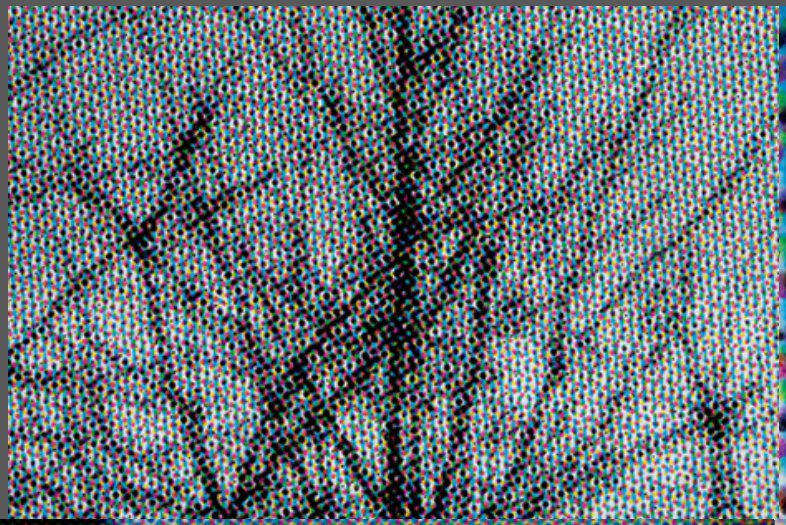
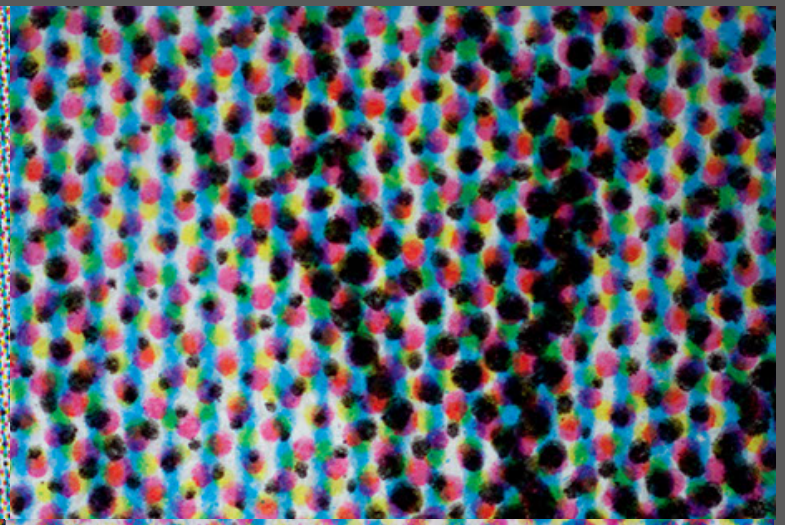
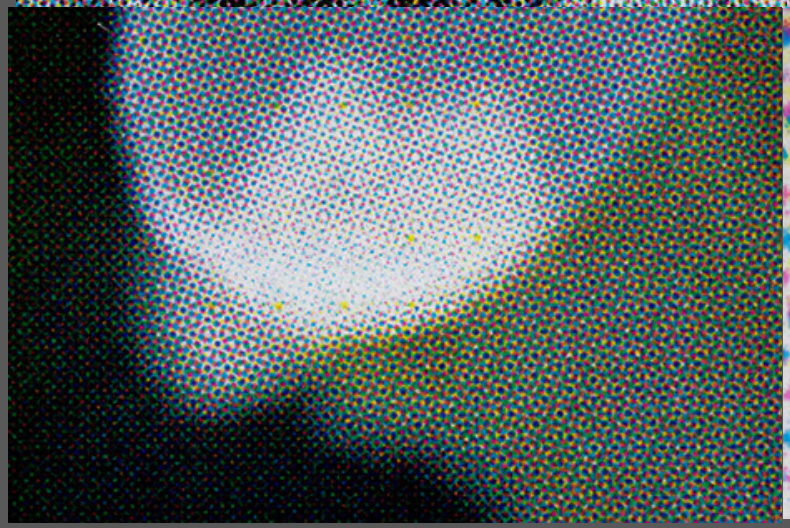
EP ID Summary

Liquid toner
10x, 50x





Dry toner
10x, 50x



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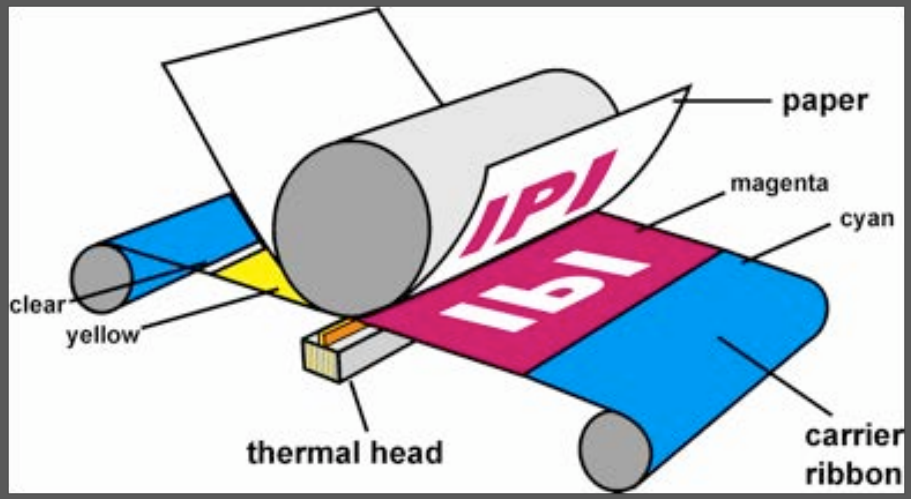
Dye Diffusion Thermal Transfer (D2T2)

- Materials
- Printing Technology



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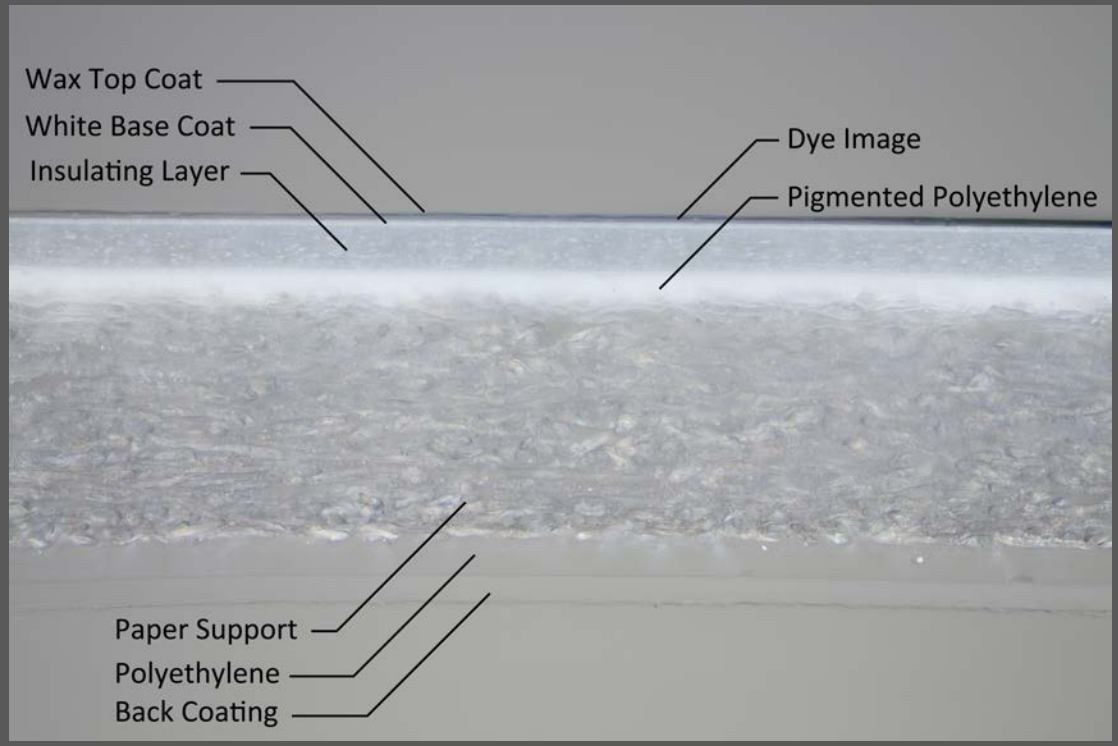
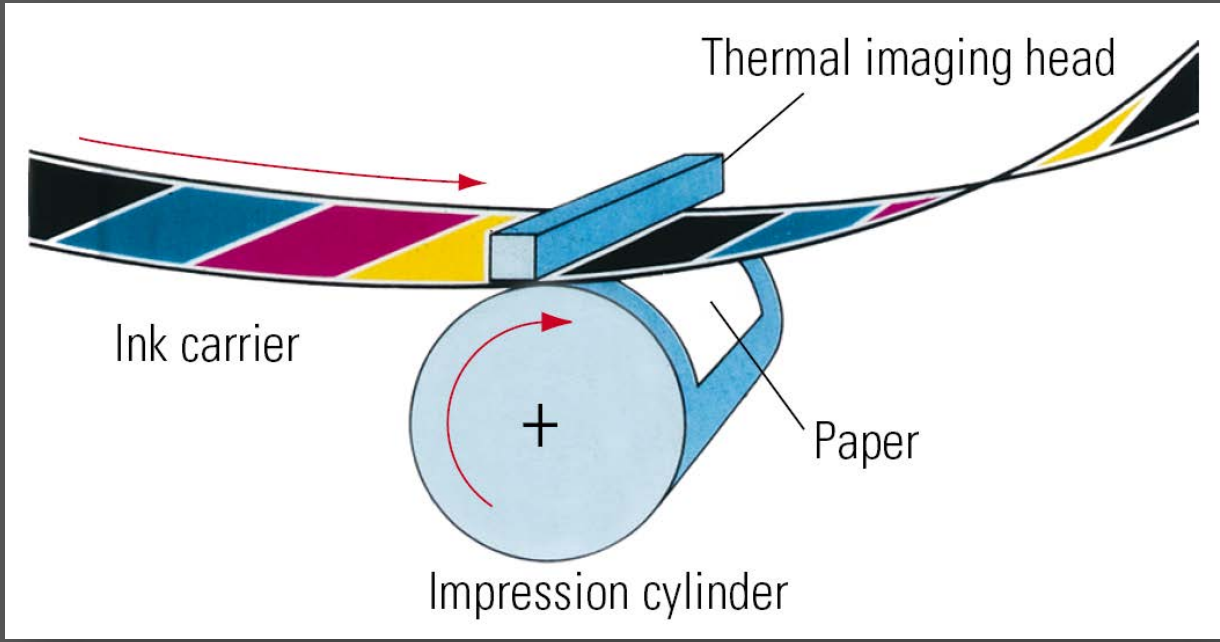
Materials: D2T2

- Image Material
- Support
- Support Coating(s)



D2T2

Dye is heat transferred to the substrate



D2T2

10 x Magnification

50 x Magnification

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D2T2

Iridescent surface sheen under fluorescent light

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D2T2

Papers are RC and usually have a back print

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D2T2 ID Summary

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Digitally Exposed Silver Halide

3-color RGB laser exposure system
Conventional chemical processing

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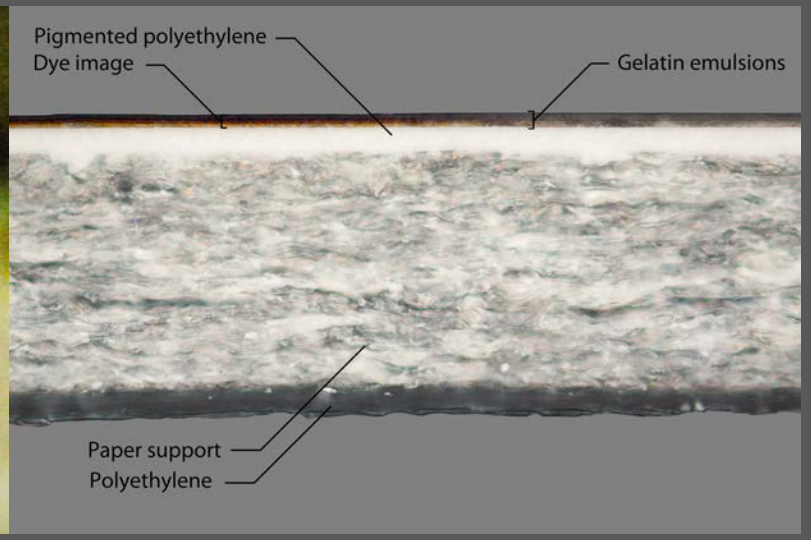
Digitally Exposed: Materials

The chemistry and materials are the same as optically printed chromogenic prints

Dye Clouds, 50x magnification



Dye in Gelatin on RC Support

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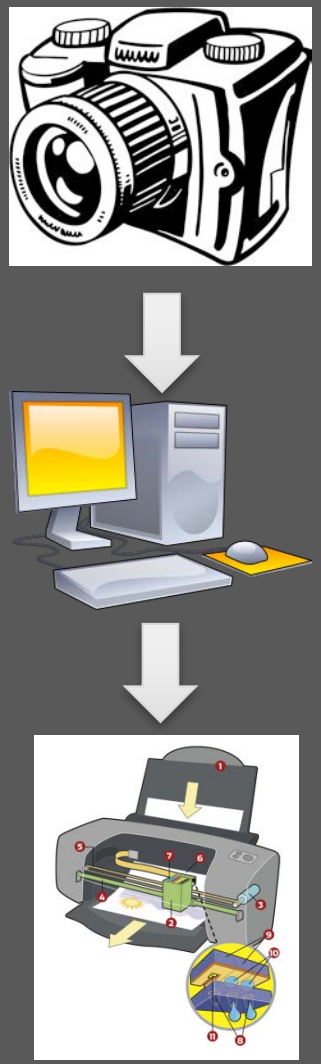
Is it a Photograph?

- An image captured by an image sensor
- Image electronically/mechanically printed.



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Survey & Thank You

Thank you!

- National Endowment for the Humanities Division of Preservation and Access
- The Andrew W. Mellon Foundation

Next Webinar

- Wednesday, December 13, 2:00pm EST
- A Methodology for Process Identification, Part 1

Survey!

- A brief survey will appear at the end, please give us feedback!

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