

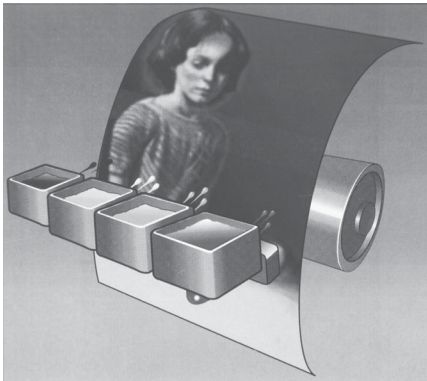


THE KINDS OF PRINTERS; HOW THEY WORK, AND WHAT EACH DOES BEST . . .

INKJET PAINTERS

Four separate inks each sprays its respective color droplets.

Inkjet printers work by spraying tiny droplets of ink



onto a substrate. Currently, there are two techniques: one heats up the ink causing a bubble to form. The pressure produced by the expanding bubble forces the ink droplets out of the print head. Canon's "Bubble Jet" printers are named after this technology. The second approach uses a piezoelectric diaphragm that vibrates and forces the ink out of the print head.

Color inkjet printers have four separate reservoirs for ink in a single cartridge, which is connected to an assembly that contains four separate print heads, all physically linked together.

Pros: 1. Inkjet printers are inexpensive. 2. They're quiet. 3. Some can use plain paper

4. Some have higher resolution than other, more expensive color printers. 5. The physically linked print heads minimize color registration problems. 6. They're usually smaller and lighter than laser printers. 7. Has a very low cost per printed page.

Cons: 1. Special paper may be required. 2. Some are slow. 3. Some yield poor quality output. 4. Not all are true 4-color printers. 5. Generally, they don't have PostScript capability built in. 6. Ink may smear. 7. Ink in printer evaporates over time.

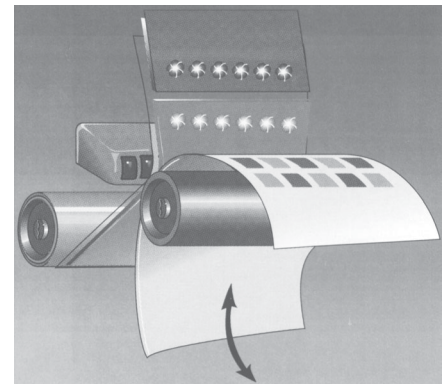
DYE SUBLIMATION PRINTERS

Utilizes ribbons with consecutive CMYK sequence and precise temperature control for transfer.

Dye sublimation printers are similar in many ways to color thermal wax transfer printers. Like those printers, it uses a color transfer ribbon that has consecutive blocks of the four process colors on it. Instead of wax, however, these color blocks on the ribbon contain color dyes that, when heated, go from a solid state to a gaseous state (that's what sublimation means).

The gaseous dye then comes in contact with a specially

designed coated paper that absorbs the dye on contact, creating the colored image. The amount of dye that is released is controlled by the heat of the print head element, with higher temperatures resulting in more dye being released. Each element can have one of 256 different temperature levels. As with the color thermal wax trans-



fer approach, the paper moves past the print head and must be realigned four times (once for each process color).

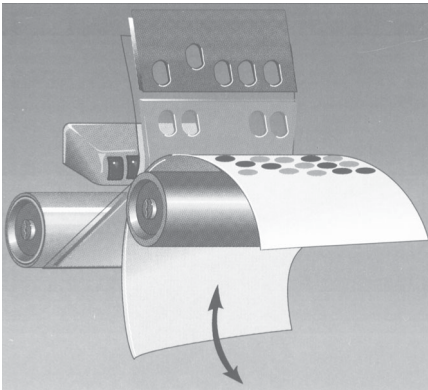
Pros 1. Continuous tone images with photographic quality are possible. 2. Produces the best-looking output of any color printer. 3. Most are PostScript compatible. 4. Can handle 32-bit images.

Cons: 1. These printers are very expensive. 2. Print speed is very slow. 3. Cost per printed page is very high. 4. Special paper is required.

THERMAL TRANSFER PRINTERS

Rely on consecutive CMYK wax color segments and less precise temperature control.

Color thermal wax transfer printers use a transfer ribbon or roll that contains page-sized rectangles of wax in each of the process colors (cyan, magenta, yellow and black). To print an image, a color segment on the transfer ribbon is placed over the page to be printed and then the print head with its heating elements is placed on top of the transfer ribbon. As an element on the print head is heated, the wax on the transfer ribbon below it melts and a dot of color is



transferred from the ribbon to the paper below it. The paper moves past the print head and is realigned with consecutive blocks of color on the transfer ribbon four times, once for each color.

Pros: 1. Bright, vibrant colors. 2. PostScript or compatible controller is included. 3. Full page prints in about a minute. 4. Printed output is more rugged than that produced by other techniques. 5. Cost per page is moderately priced.

Cons: 1. Color registration R08/02

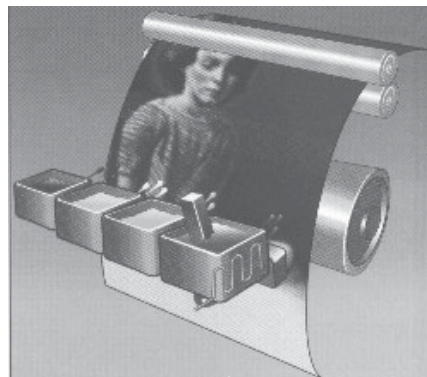
could be a problem. 2. Special paper is usually required. 3. Printer cost is high. 4. Output quality suffers when cheaper three-color ribbons are used.

PHASE CHANGE PRINTERS

Similar to ink jet except it uses solid inks which are melted just prior to dispersion onto substrate.

The printer is a close relative to the inkjet. The major difference is the ink starts as a solid, which must first be melted and liquefied. After the image is sprayed onto the page and cooled, the paper passes through pressure rollers that flatten out the wax droplets.

Pros: 1. No special paper is required. 2. Wax-based ink doesn't smear. 3. Solidification of ink minimizes absorption and yields sharper images. 4. Linked print heads minimize



color registration problems. 5. Has a low cost per printed page. 6. Ink does not evaporate.

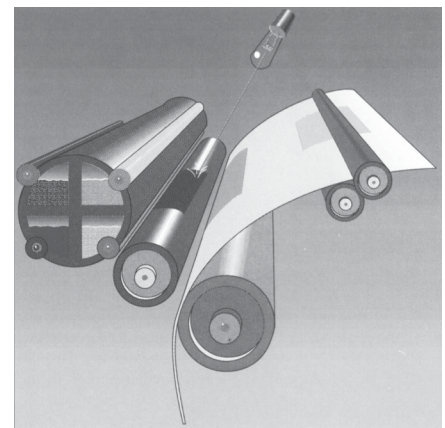
Cons: 1. Folding a printed page results in visible cracks in the ink. 2. Striations or ink ridges caused by print head give printed output a texture. 3.

Printing is slower than thermal wax transfer method.

COLOR LASER PRINTERS

May image drum 4 times then print all colors or may image the drum and print each color separately, in sequence.

A color laser printer works like a regular laser printer, except it has a developing unit that contains four chambers, one for each of the four process colors. The laser selectively exposes portions of a photosensitive drum, one color at a time. The exposed portions of the drum become electrically charged, and as the drum rotates in close proximity to the developing unit, toner is at-



tracted to the exposed and charged areas on the drum. The toner on the drum is then transferred to the paper. This process happens four times, once for each color. After the four passes, heated rollers fuse the toner onto the page.

Pros: 1. Resolution is higher than most laser printers (400 x 400 dpi). 2. Printer speed is fast. 3. Cost per print is low. 4. Uses plain paper. 5. Quality is good.

Cons: 1. Printer cost is extremely high; 2. Units usually quite large, bulky and heavy.

OTHER WATERLESS FILM IMAGING SYSTEMS

As the industry struggles with methods of imaging, there are a number of film systems being offered which promise to eliminate the environmentally disastrous chemical based film developing systems.

These systems are designed to operate in standard or special imaging machines and usually produce a negative matrix (like a traditional film negative) which can be used to create printing image carriers.

At the same time, some imaging systems are now available which make a plate directly, without intermediate copies, films, etc. As they progress in their development and adoption, waterless film imaging may be a solution to an age old problem which has arrived too late to be of significant value to the industry.

The most popular ones are noted below:

XEROX

Relying on technology similar to that used in electrostatic copiers, Xerox's Verde film contains selenium particles that through a combination of laser imaging and heat become randomly oriented, creating areas of higher density.

POLAROID

Derived from medical

technology, the Polaroid process uses a special laser imagesetter to cause carbon particles to release from a donor layer to a receiver. When the layers are peeled apart, the film is ready for use.

KODAK

In this dry-imaging process, a high-powered laser vaporizes dye from the image area of a film negative, leaving the clear film base. There is no further processing, but a special purpose imagesetter is required.

