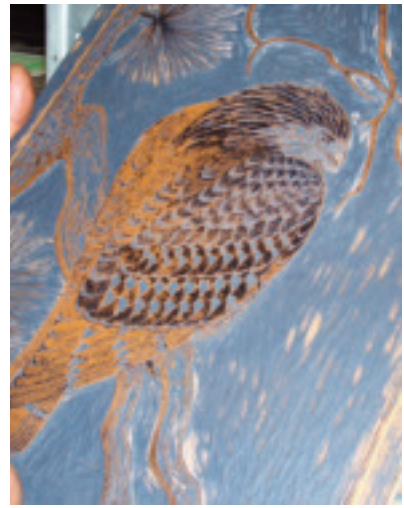


The Museum of Printing, North Andover, MA and the Image Carrier

www.museumofprinting.org

Relief printing



Wood cut



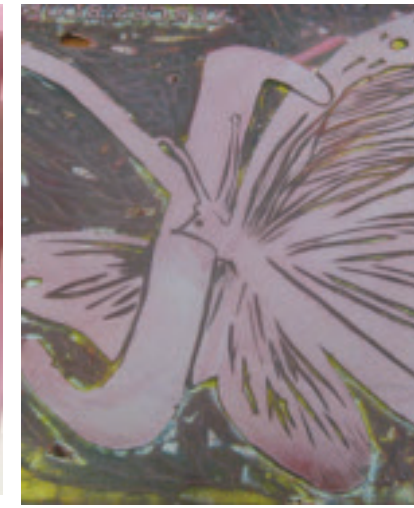
Wood engraving and Metal plate



Relief cylinder



Flexographic plate



Linoleum cut

Wood cuts and wood engravings pre-dated moveable type. Called "xylographic printing," it was used before Gutenberg for illustrations, playing cards, and small documents. Moveable type allowed corrections and editing. A wood engraving uses the end grain, where a wood cut uses the plank grain.

Polymer plates are made from digital files which drive special engraving machines to produce relief plates. These plates are popular with many of today's letterpress printers who produce invitations, and collectible prints.

Metal relief cylinders were used to print repetitive designs, such as those on wrapping paper and wall paper.

In the 1930s, the invention of cellophane led to the development of the anilox roller and flexographic printing. Today, flexography prints most of the flexible packaging film which accounts for about half of all packaged products.

Hobbyists, artists, and printmakers cut away non-printing areas on sheets of linoleum to create relief surfaces.

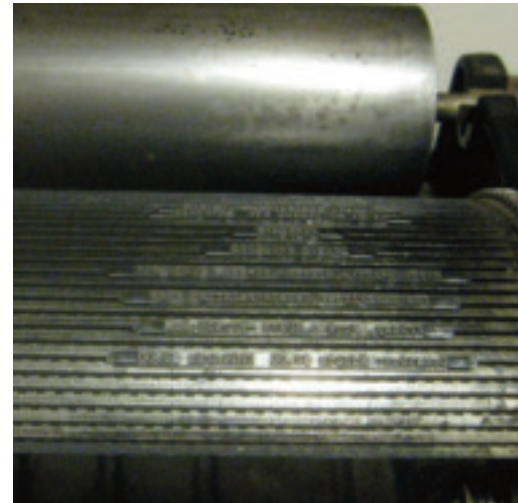
Moveable type



Foundry type



Wood type



Multigraph



Graphotype plate

Foundry type began with Gutenberg and evolved through Jenson, Garamond, Caslon and many others. Garamond was the first printer to cast type that was sold to other printers. By the 1880s there were almost 80 foundries in the U.S. One newspaper could keep one foundry in business. Machine typesetting changed the status quo and the Linotype had an almost immediate effect on type foundries. Twenty-three foundries formed American Type Founders in 1890.

For large point sizes needed for posters, wood type evolved. The Hamilton Wood Type Company in Two Rivers, WI continued its manufacture was discontinued in the 1980s.

The Multigraph was an office printer for form letters that used metal type that was inserted in slots on a grooved cylinder. A crank turned the cylinder which picked up ink and printed sheets, each with the same copy. The Addressograph-Multigraph company of Cleveland, OH was one of the first suppliers of office equipment for mailing and reproduction.

The Graphotype uses a set of dies and punches to either emboss or deboss metal plates or tags for selected applications. The quality was not good enough for commercial print but did find applications in list maintenance, addressing, and military dog tags.

Machine typesetting



Linotype



Ludlow



Monotype



Metal cuts

The quest for mechanized typesetting began in the 1860s and became a reality with the Mergenthaler Linotype in 1886. The Linograph and Intertype machines were competitive linecasters. In 1890 the Monotype separated the input and output functions and, after 1900, the Ludlow improved the setting of display type.

All three mechanical typesetters used matrices to cast the lines (Linotype and Ludlow) and characters (Monotype). Ottmar Mergenthaler required two attempts before the Linotype was introduced. Tolbert Lanston got the idea for the Monotype keyboard and its roll of punched tape from fellow Federal worker Herman Hollerith, who invented the punch card. Hollerith's company, Computing and Tabulating, became IBM in 1934.

Washington Ludlow developed a type caster for lines of display type and met with competition from the Linotype A-P-L, which was discontinued.

Engravings and castings of logos, nameplates, signatures, dingbats, and other "cuts" were integrated with metal type for page composition. Many were mounted on wood blocks.

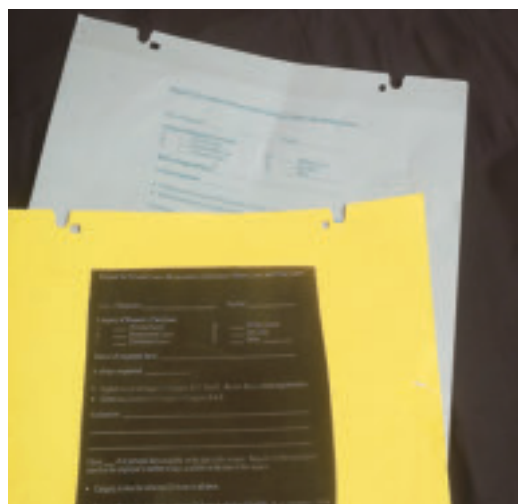
Lithography



Litho stone



Chromolithography



Aluminum plate



Direct Imaging plate

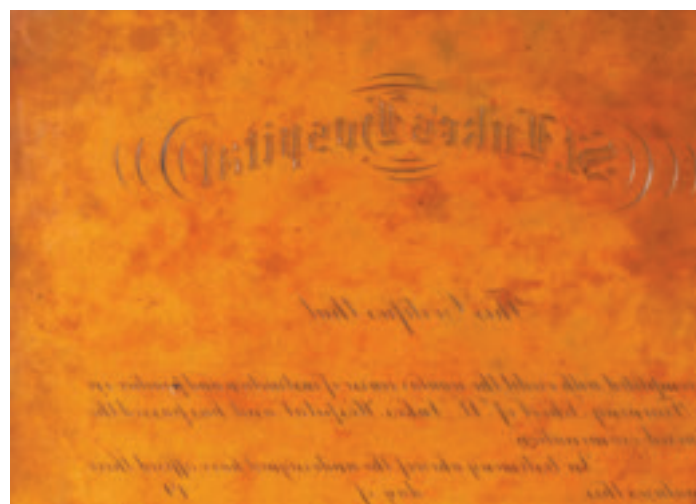
Bavarian composer Alois Senefelder discovered stone lithography around 1798 (from the Greek: litho = stone, graphy = writing). Anything that could be drawn or written with a greasy substance on the porous limestone could be reproduced. He called it "chemical printing."

Currier & Ives and others used partial images on a number of stones to print multi-color "pictorial" imagery. Chromolithography progressed in the 1800s and led to colorful posters, art, collectible prints for albums, and holiday cards.

Around 1900 Ira Rubel developed "offset lithography" and applied the use of the rubber blanket. Glass sheets became the first negatives and aluminum replaced the stone plates. In 1993, Presstek of Hudson, NH invented the Direct Imaging (DI) technology that images plates on press and reduces makeready time for multi-color printing.

Called albertype, after its inventor, this process consists in pouring a layer of gelatine over the surface of a zinc or glass plate which is exposed to light to receive the image. The gelatine hardens in proportion to the amount of light received, the unexposed parts remaining soft and capable of retaining moisture, and then printed lithographically. Ink adheres to the surface in inverse proportion to the amount of moisture retained, the hard areas of gelatine printing the darkest.

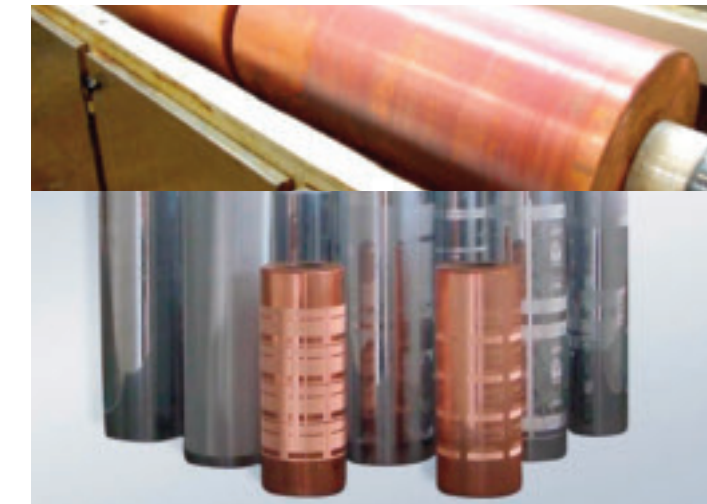
Intaglio/Gravure



Copperplate engraving



Music engraving



Gravure cylinders

Intaglio printing is based on an image recessed into the carrier. The paper receives the ink from the incised marks, although thin films of ink may be left on the surface to produce tonal effects. The paper is dampened so that under printing pressure it will be squeezed into all the inked recesses of the plate. Artists who used intaglio include Rembrandt and Pablo Picasso.

Copperplate engraving was used for illustrations, art, and official documents. Paul Revere illustrated the Boston Massacre into a metal plate.

Music typesetting used sheets of tin or zinc or other metal alloys. Staff lines were scribed and notes and letters were created with punches. These plates were later melted down to create new plates. Their tin ingredient led to the term "Tin Pan Alley" as the location for music publishers.

Gravure cylinders are used for million-plus runs of publications, catalogs, packaging, and products. The cylinders are etched with diamond styli to create wells of different depths, which controls the amount of ink delivered to the substrate. Gravure is excellent for the reproduction of color imagery and was invented to complement early photographic developments. Paper currency is printed from intaglio plates.

Other



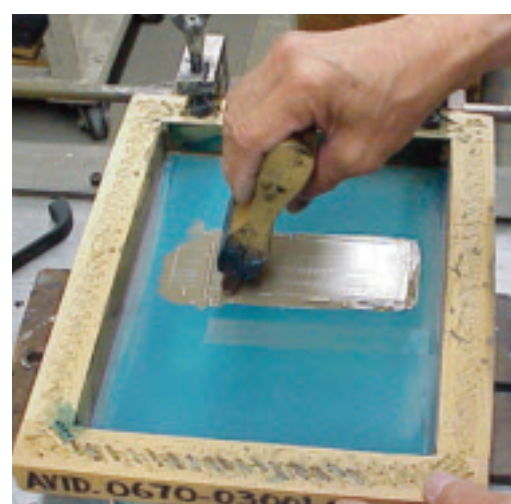
Mimeograph (stencil)



Stereotype mold/plate



Photo engraving



Screen stencil

Thomas Edison's "Electric Pencil" was the basis for the mimeograph stencil duplicating system. The Museum has the Model 0 (shown at left) which was marketed by Edison and Albert Blake Dick. Later, the Gestetner would be a competing stencil duplicator. Today, certain Riso printers use lasers to produce the page stencils.

Lord Stanhope invented the stereotyping process just after 1800. The stereotype material was pressed against the type form to make a mold into which molten metal was poured. This reduced the wear on metal type through the production of duplicate metal printing plates. After 1870 most books were printed with such plates, called electrotypes. Most daily newspapers had multiple presses and used the stereotype mold (or flong) to cast multiple letterpress cylinders, which permitted the use of paper rolls instead of sheets.

In the 1890s, Frederick Ives developed the halftone process which allowed the production of plates for reproducing pictures. The metal plates were coated with a photographic emulsion and after exposure, they were immersed in acid baths to create a relief surface.

The modern screen printing process was patented by Samuel Simon, and is also known as serigraphy. The screens were originally made of silk but were later made from plastic and other materials.