

1.1 - Printing Method Photogravure

Photogravure was invented in 1890s Germany for commercial printing of periodicals, books and fine art reproductions and is a tonal process that enables gentle changes in the gradation of colour between solids and tints. It is essential that the artwork is created for the process in order to fully exploit the potential beauty of the method, therefore the design should possess a complete range of tones.

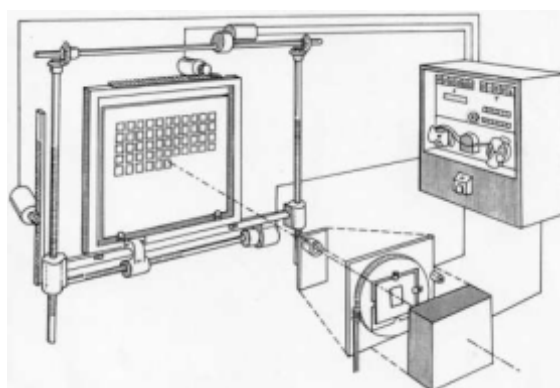


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With all forms of gravure, ink is held in microscopic cells that are recessed into the cylinder, so for this reason alone it works on a similar principle to intaglio, but lacks the raised imagery and therefore much of its collector appeal. The fluid ink is applied to the surface of the cylinder and fills the cells, any excess ink is removed with a wiper known by printers as a 'doctor blade' and is then transferred from the cells to the substrate under pressure with the help of an impression roller.



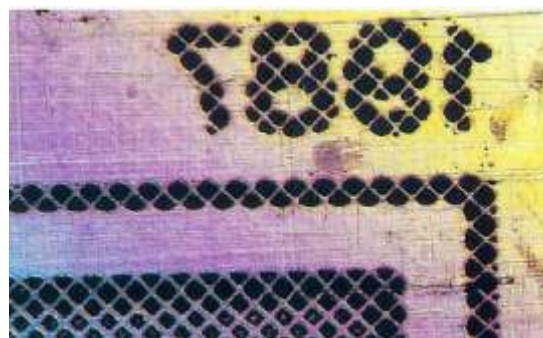
A 'step and repeat' camera showing a paper tape system for positioning each image correctly.



The Principles of a 'step and repeat' camera system.



Inspecting the multi-positive. Note the 'spare' Machin stamps beyond the sheet margin, indicating that far more exposures than required had been made.



Macro image of cells before the era of electronic engraving.

The multi-positive, when developed, fixed and checked was next taken to the planning room where certain other details were added, such as a cylinder number, inprint and registration markings.

The Base Cylinder, Carbon tissue, Screening, Exposing the carbon tissue, Carbon tissue to printing cylinder, Etching & Proofing

Chroming Cells have always been deemed to be the most important part of the gravure process. The quality of the printed image depends to a great extent on the cell structure.

Hard chromium plating baths were first introduced commercially in 1930 to provide a tougher surface for printing cylinders by avoiding tarnishing and wear by friction between the paper and the cylinder, thus prolonging their life and saving costs.

Thanks to its tough metal qualities and fine grain structure the introduction of chromium, which has not been bettered to this day and is still used to protect electronically engraved cylinders, enabled clearer, sharper detail across the entire print run. From the first through to the last stamp sheet printed, impressions were not subjected to a slow deterioration the further you got into the production run.

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Re-chroming

The darker the desired image area, the deeper the cuts into the cylinder (i.e. closer to 70 microns in depth) and, conversely, the lighter the desired image, the shallower the cuts (nearer to zero microns). The depth achieved is controlled by the amount of voltage that is applied to each cell being cut into the copper.

There is always a separate cylinder created for each colour, which often comprises the four colour process (CMYK) plus.

How are gravure printing plates made?

Gravure printing plates may be either flat polished copper plates or copper-plated cylinders. In order to transfer the images from original artwork or copy to the gravure plates, the platemakers use positives or the originals-not negatives. Gravure plates may be made to prints solid colors, continuous tones, or screens somewhat like lithography or halftone letterpress. The continuous tone gravure is not so frequently used in the entire printing of postage stamps, possibly owing to the limited area of the stamps.

The subjects for reproduction are photographed, then positives are made on glass from a negative or negatives. The problem in converting a photograph, drawing, or design with or without lettering, or any combination of the units, is always the same. The solid masses in the original must be reproduced as solid masses in the finished printing. The photographs or drawings with graduating tones offer a difficulty which platemakers overcame many years ago. When graduating tones are reproduced by gravure they must be broken into square cells almost microscopic in size. Gravure platemakers achieve this break up of tones by following a number of predetermined steps in etching.

After the positives have been assembled on glass or some other transparent substance, the next step is printing a screen on a substance gravure people call carbon tissue. This is an odd name, for carbon tissue is a heavy paper coated with gelatin to which color pigment, usually browns or reds, has been added. It looks neither like carbon nor like tissue. The carbon tissue is sensitized by submerging it in a sensitizing bath and hanging it up to dry.

After the screen has been printed on the carbon tissue, it is placed over the continuous tone positive in a printing frame. The amount of light passing through in various degrees gives a varying tone graduation on the carbon tissue. When this operation of exposure has been carefully done, the carbon tissue is ready for application to the copper printing plate. The gelatin side of the carbon tissue is applied to the plate and squeegeed (pressed) securely to it. The paper backing is dampened and carefully removed, thus leaving a coating of gelatin on the copper plate. Following this operation, the plate is prepared for the etching process by painting out the parts of it that platemakers do not wish to have etched.

Finally the plate is treated with etching solutions of various strengths. This series of solutions bite their way through the gelatin film in proportion to the thickness of the film itself. The thickness of the gelatin varies with the tones on the original subjects which were photographed in the first stage of the process. The acid bites through the thinnest parts of the gelatin first and causes the deepest pockets in the copper plate. Similarly, the copper plate contains minute pockets tached by the acid. These vary from the very shallowest to the deepest. After the plate is finished by hand, it is ready for printing. When the plates are inked on the press the tiny cups made during the etching process fill with ink. A doctor blade removes the surplus ink, leaving microscopic cells of ink ready to be transferred to the paper.

Some variation of the process described eliminates the screening on the carbon tissue. In its place, the plate is treated with resin or some bituminous substance before the carbon tissue is applied. In such gravure printing, there is no defined pattern of screen on the printed surface. A similar lack of pattern of dots has been achieved by the use of a screen the platemakers call Mezzo screen.