

Etching

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For other uses of etch or etching, see Etching (disambiguation), for the history of the method, see old master prints.

Etching is the process of using strong acid to cut into the unprotected parts of a metal surface to create a design in intaglio in the metal (the original process - in modern manufacturing other chemicals may be used on other types of material). As an intaglio method of printmaking, it is, along with engraving, the most important technique for old master prints, and remains widely used today.

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Christ Preaching, known as *The Hundred Guilder print*; etching c1648 by Rembrandt

Basic method

In pure etching, a metal (usually copper, zinc or steel) plate is covered with a waxy ground which is resistant to acid. The artist then scratches off the ground with a pointed etching needle^[1] (<http://expositions.bnf.fr/bosse/grand/207.htm>) where he/she wants a line to appear in the finished piece, so exposing the bare metal. The échoppe, a tool with a slanted oval section is also used for "swelling" lines.^[2] (<http://expositions.bnf.fr/bosse/grand/209.htm>) The plate is then dipped in a bath of acid, technically called the mordant (from the French for "bite"), or has acid washed over it.^[3] (<http://expositions.bnf.fr/bosse/grand/210.htm>) The acid "bites" into the metal, where it is exposed, leaving behind lines sunk into the plate. The remaining ground is then cleaned off the plate. The plate is inked all over, and then the ink wiped off the surface, leaving only the ink in the etched lines.

The plate is then put through a high-pressure printing-press together with a sheet of paper (often moistened to soften it).^[4]

(<http://expositions.bnf.fr/bosse/grand/204.htm>) The paper picks up the ink from the etched lines, making a print. The process can be repeated many times; typically several hundred impressions (copies) could be printed before the plate shows much sign of wear. The work on the plate can also be added to by repeating the whole process; this creates an etching which exists in more than one state.

Etching can be, and very often has been, combined with other intaglio techniques like engraving (eg Rembrandt) or aquatint (eg Goya).

History



The Soldier and his Wife. Etching by Daniel Hopfer, who is believed to have been the first to apply the technique to printmaking

Origin

Etching by goldsmiths and other metal-workers in order to decorate metal items such as guns, armour, cups and plates has been known in Europe since the Middle Ages at least, and may go back to antiquity. The elaborate decoration of armour, in Germany anyway, was an art probably imported from Italy around the end of the 15th century - little earlier than the birth of etching as a printmaking technique. The process as applied to printmaking is believed to have been invented by Daniel Hopfer (circa 1470-1536) of Augsburg, Germany. Hopfer was a craftsman who decorated armour in this way, and applied the method to printmaking, using iron plates (many of which are still extant). Apart from his prints, there are two proven examples of his work on armour: a shield from 1536 now in the Real Armeria of Madrid and a sword in the Germanisches Nationalmuseum of Nuremberg. An Augsburg horse armour in the German Historical Museum, Berlin, dating to between 1512 and 1515, is decorated with motifs from Hopfer's etchings and woodcuts, but this is no evidence that Hopfer himself worked on it, as his decorative prints were largely produced as patterns for other craftsmen in various media. The switch to copper plates was probably made in Italy, and thereafter etching soon came to challenge engraving as the most popular medium for artists in printmaking. Its great advantage was that, unlike engraving which requires special skill in metalworking, etching is relatively easy to learn for an artist trained in drawing.

Callot's innovations: échoppe, hard ground, stopping-out

Jacques Callot (1592-1635) from Nancy in Lorraine (now part of France) made important technical advances in etching technique. He developed the échoppe, a type of etching-needle with a slanting oval section at the end, which enabled etchers to create a swelling line, as engravers were able to do.

He also seems to have been responsible for an improved, harder, recipe for the etching ground, using lute-makers varnish rather than a wax-based formula. This enabled lines to be more deeply bitten, prolonging the life of the plate in printing, and also greatly reducing the risk of "foul-biting", where acid gets through the ground to the plate where it is not intended to, producing spots or blotches on the image. Previously the risk of foul-biting had always been at the back of an etcher's mind, preventing him from investing too much time on a single plate that risked being ruined in the biting process. Now etchers could do the highly detailed work that was previously the monopoly of engravers, and Callot made full use of the new possibilities.

He also made more extensive and sophisticated use of multiple "stoppings-out" than previous etchers had done. This is the technique of letting the acid bite lightly over the whole plate, then stopping-out those parts of the work which the artist wishes to keep light in tone by covering them with ground before bathing the plate in acid again. He achieved unprecedented subtlety in effects of distance and light and shade by careful control of this process. Most of his prints were relatively small - up to about six inches or 15 cm on their longest dimension, but packed with detail.

One of his followers, the Parisian Abraham Bosse spread Callot's innovations all over Europe with the first published manual of etching, which was translated into Italian, Dutch, German and English.

The 17th century was the great age of etching, with Rembrandt, Giovanni Benedetto Castiglione and many other masters. In the 18th Piranesi, Tiepolo and Daniel Chodowiecki were the best of a smaller number of fine etchers. In the 19th and early-20th century the Etching revival produced a host of lesser artists, but no really major figures. Etching is still widely practiced today.

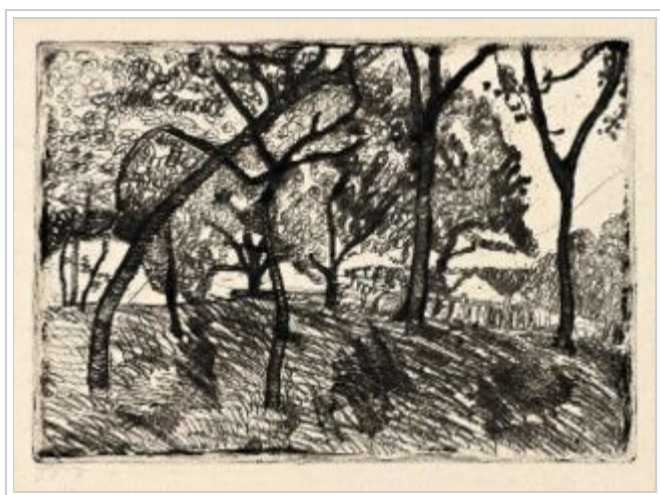
Variants: Aquatint, soft-ground and relief etching

- Aquatint uses acid-resistant resin to achieve tonal effects
- Soft-ground etching uses a special softer ground. The artist places a piece of paper (or cloth etc in modern uses) over the ground and draws on it. The print resembles a drawing.
- Relief etching. Invented by William Blake in about 1788; from 1880-1950 a photo-mechanical ("line-block") variant was the dominant form of commercial printing for images. A similar process to etching, but printed as a relief print, so it is the "white" background areas which are exposed to the acid, and the areas to print "black" which are covered with ground. Blake's exact technique remains controversial. He used the technique to print texts and images together.



Etching by Jacques Bellange, *Gardener with basket* c1612

Modern Technique in detail



Landscape under Trees, etching by Paula Modersohn-

A waxy acid-resist, known as a ground, is applied to a metal plate, most often copper or zinc but steel plate is another medium with different qualities. There are two common types of ground, hard ground and soft ground. Hard ground can be applied in two ways. Solid hard ground comes in a hard waxy block. To apply hard ground of this variety the plate to be etched is placed upon a hot-plate, a kind of metal worktop that is heated up. The plate heats up and the ground is applied by hand, melting onto the plate as it is applied. The ground is spread over the plate as evenly as possible using a roller. Once applied the etching plate is removed from the hot-plate and allowed to cool which hardens the ground.

The second way to apply hard ground is by liquid hard ground. This comes in a can and is applied with a brush upon the plate to be etched. Exposed to air the hard ground will harden. Some

Becker 1876-1907

printmakers use bitumen as hard ground, although often bitumen is used to protect steel plates from rust and copper plates from aging. After the ground has dried the artist "smokes" the plate,

applying a flame to the plate to darken the ground and make it easier to see what parts of the plate are exposed. Afterwards the artist uses a sharp tool to scratch into the ground, exposing the metal.

Soft ground also comes in liquid form and is allowed to dry but it does not dry hard like hard ground and is impressionable. After the soft ground has dried the printmaker may apply materials such as leaves, objects, hand prints and so on which will penetrate the soft ground and expose the plate underneath.

The ground can also be applied in a fine mist, using powdered rosin or spraypaint. This process is called aquatint, and allows for the creation of tones, shadows, and solid areas of color.

The design is then drawn (in reverse) with an etching-needle or *échope*. An "echoppe" point can be made from an ordinary tempered steel etching needle, by grinding the point back on a carborundum stone, at a 45 - 60 degree angle. The "echoppe" works on the same principle that makes a fountain pen's line more attractive than a biro's: The slight swelling variation caused by the natural movement of the hand "warms up" the line, and although hardly noticeable in any individual line, has a very attractive overall effect on the finished plate. It can be drawn with in the same way as an ordinary needle

The plate is then completely submerged in an acid that eats away at the exposed metal. Copper plates and zinc plates are often dipped into ferric chloride solution and steel plates are dipped into nitric acid. Solutions are usually 2 parts FeCl_3 to 2 parts water or for steel plate, 1 part nitric to 3 parts water. The strength of the acid determines the speed of the etching process. The etching process is known as *biting* (see also spit-biting below). The waxy resist protects the acid from biting the parts of the plate have not been exposed. The longer the plate remains in the acid the deeper the "bites" become.

During the etching process the printmaker uses a bird feather or similar item to wave away bubbles and detritus, produced by the dissolving process, from the surface of the plate. If a bubble is allowed to remain upon the plate then it will stop the acid biting into the plate where the bubble resides. Zinc produces more bubbles much more rapidly than copper and steel and some artists use zinc's ability to do this to produce interesting round bubble like circles within their prints like a milky way effect. The detritus is powdery dissolved metal that fills the etched grooves and can also block the acid from biting evenly into the exposed plate surfaces. Another way to remove detritus from a plate is to place the plate to be etched face down within the acid upon plasticine balls or marbles, although the drawback of this technique is the exposure to bubbles and the inability to remove them readily.

For aquatinting a printmaker will often cut off a test strip of metal about a centimetre to three centimetres wide. The strip will be dipped into the acid for a specific number of minutes or seconds. The metal strip will then be removed and the acid washed off with water. Part of the strip will be covered in ground and then the strip is redipped into the acid and the process repeated. The ground will then be removed from the strip and the strip inked up and printed. This will show the printmaker the different degrees or depths of the etch, and therefore the strength of the ink color, based upon how long the plate is left in the acid.

The plate is removed from the acid and washed over with water to remove the acid. The ground is removed with a solvent such as turpentine. Turpentine is often removed from

Examples of etching techniques



etching



aquatint

the plate using methylated spirits as turpentine is greasy and can affect the application of ink and the printing of the plate.

The entire plate is inked.

Spit-biting is a process whereby the printmaker will apply acid to a plate with a brush in certain areas of the plate. The plate may be aquatinted for this purpose or exposed directly to the acid.

A piece of matte board, a plastic "card", or a wad of cloth is often used to push the ink into the incised lines. The surface is wiped clean with a piece of stiff fabric known as *tarlatan* and then either wiped with newsprint paper or some printmakers prefer to use the blade part of their hand or palm at the base of their thumb. The wiping leaves ink in the incisions. You may also use a folded piece of organza silk to do the final wipe. If copper or zinc plates are used plate surface is left very clean and therefore white in the print. If steel plate is used then the plate's natural tooth gives the print a grey background similar to the effects of aquatinting. As a result steel plates do not need aquatinting as gradual exposure of the plate via successive dips into acid will produce the same result.

A damp piece of paper is placed over the plate and it is run through the press.



soft ground etching (vernismou)

Industrial uses

Etching is also used in the manufacturing of printed circuit boards and semiconductor devices (see Etching (microfabrication)), on glass, and in the preparation of metallic specimens for microscopic observation.

Controlling the acid's effects

Hard grounds

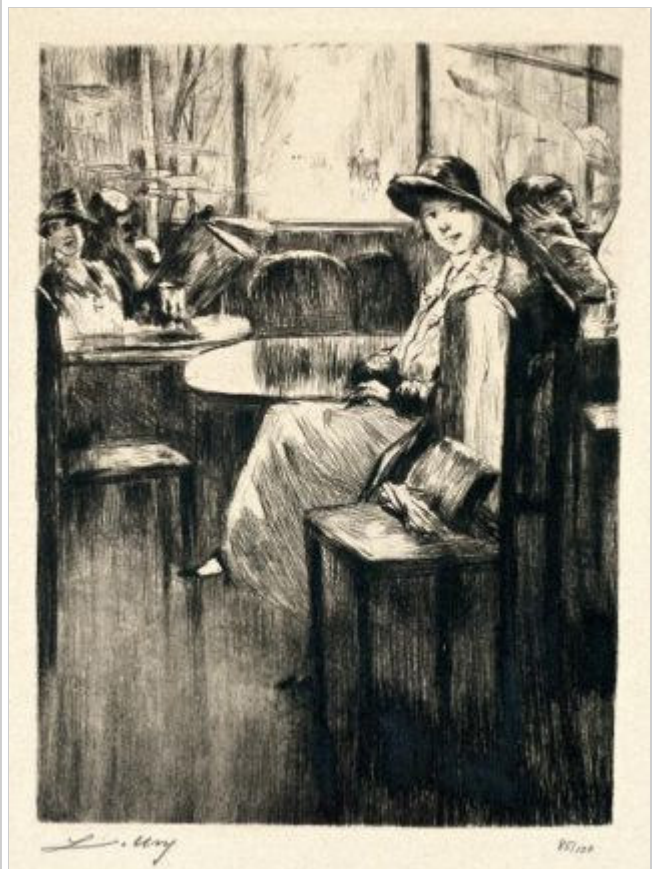
There are many ways for the printmaker to control the acid's effects. Most typically, the surface of the plate is covered in a hard, waxy 'ground' that resists acid. The printmaker then scratches through the ground with a sharp point, exposing lines of metal that are attacked by the acid

Aquatint

Aquatint is a variation in which particulate resin is evenly distributed on the plate, then heated to form a screen ground of uniform but less than perfect density. After etching any exposed surface will result in a roughened (i.e. darkened) surface. Areas that are to be light in the final print are protected by varnishing between acid baths. Successive turns of varnishing and placing the plate in acid create areas of tone difficult or impossible to achieve by drawing though a wax ground.

Printing

Printing the plate is done by covering the surface with ink, then rubbing the ink off the surface with *tarlatan* cloth or newsprint, leaving ink in the roughened areas and lines. Damp paper is placed on the plate, and both are run through a printing press; the pressure forces the paper into contact with the ink, transferring the image (*c.f.*, chine-collé). Unfortunately, the pressure also subtly degrades the image in the plate, smoothing the roughened areas and closing the lines; a copper plate is good for, at most, a few hundred printings of a strongly etched imaged before the degradation is



Young Girl in cafe with street-view, etching by Lesser Ury 1861-1931

considered too great by the artist. At that point, the artist can manually restore the plate by re-etching it, essentially putting ground back on and retracing their lines; alternately, plates can be electro-plated before printing with a harder metal to preserve the surface. Zinc is also used, because as a softer metal, etching times are shorter; however, that softness also leads to faster degradation of the image in the press.

See Also

For the history of the method, see old master prints.

Faults

Faux-bite or "over-biting" is common in etching, and is the effect of minuscule amounts of acid leaking through the ground to create minor pitting and burning on the surface. This incidental roughening may be removed by smoothing and polishing the surface, but artists often leave faux-bite, or deliberately court it by handling the plate roughly, because it is viewed as a desirable mark of the process.

Trivia

The phrase "Want to come up and see my etchings?" is a romantic cliché in which a man entices a woman to come back to his place

with an offer to look at something artistic. Some accounts say the expression arose from the understanding, in the New York City of his day, that many of Stanford White's notorious affairs involved such invitations to a townhouse that he rented and had furnished with etchings of nudes. (White died in 1906 -- in a murder over a lover.) The idea was used in 1929 in Alfred Hitchcock's first sound film, *Blackmail*, where the invitation came from the creator of the etchings his intended sex partner was to see.

External links

- Etching from the MMA Timeline of Art History (http://www.metmuseum.org/toah/hd/etch/hd_etch.htm)
- Museum of Modern Art information on printing techniques and examples of prints (<http://www.moma.org/exhibitions/2001/whatisaprint/flash.html>)
- Blog on Old Master etchings and engravings (<http://oldprints.wordpress.com/>)

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intaglio	http://en.wikipedia.org/wiki/Intaglio
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3 Variants: Aquatint, soft-ground and relief etching	http://en.wikipedia.org/wiki/Etching#Variants:_Aquatint.2C_soft-ground_and_relief
4 Modern Technique in detail	http://en.wikipedia.org/wiki/Etching#Modern_Technique_in_detail
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[1]	http://expositions.bnf.fr/bosse/grand/207.htm
[2]	http://expositions.bnf.fr/bosse/grand/209.htm
mordant	http://en.wikipedia.org/wiki/Mordant

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[3]	http://expositions.bnf.fr/bosse/grand/210.htm
printing-press	http://en.wikipedia.org/wiki/Printing-press
[4]	http://expositions.bnf.fr/bosse/grand/204.htm
state	http://en.wikipedia.org/wiki/State_(printmaking)
Goya	http://en.wikipedia.org/wiki/Goya
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	http://en.wikipedia.org/wiki/Image:The_Soldier_and_his_Wife.jpg
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edit	http://en.wikipedia.org/w/index.php?title=Etching&action=edit&ion=3
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Middle Ages	http://en.wikipedia.org/wiki/Middle_Ages
1470	http://en.wikipedia.org/wiki/1470
1536	http://en.wikipedia.org/wiki/1536
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German Historical Museum	http://en.wikipedia.org/wiki/German_Historical_Museum
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woodcuts	http://en.wikipedia.org/wiki/Woodcut
edit	http://en.wikipedia.org/w/index.php?title=Etching&action=edit&ion=4
Jacques Callot	http://en.wikipedia.org/wiki/Jacques_Callot
Nancy	http://en.wikipedia.org/wiki/Nancy
Lorraine	http://en.wikipedia.org/wiki/Duchy_of_Lorraine
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lute	http://en.wikipedia.org/wiki/Lute
Abraham Bosse	http://en.wikipedia.org/wiki/Abraham_Bosse
Giovanni Benedetto Castiglione	http://en.wikipedia.org/wiki/Giovanni_Benedetto_Castiglione
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Tiepolo	http://en.wikipedia.org/wiki/Tiepolo
Daniel Chodowiecki	http://en.wikipedia.org/wiki/Daniel_Chodowiecki
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Aquatint	http://en.wikipedia.org/wiki/Aquatint
William Blake	http://en.wikipedia.org/wiki/William_Blake
relief print	http://en.wikipedia.org/wiki/Relief_print
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ground	http://en.wikipedia.org/wiki/Ground
metal plate	http://en.wikipedia.org/w/index.php?title=Metal_plate&action=edit
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printed circuit boards	http://en.wikipedia.org/wiki/Printed_circuit_board
semiconductor devices	http://en.wikipedia.org/wiki/Semiconductor_device
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Blackmail	http://en.wikipedia.org/wiki/Blackmail_(1929_film)
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Etching from the MMA Timeline of Art History	http://www.metmuseum.org/toah/hd/etch/hd_etch.htm
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Hrvatski	http://hr.wikipedia.org/wiki/Bakropis
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Italiano	http://it.wikipedia.org/wiki/Acquaforte
Latviešu	http://lv.wikipedia.org/wiki/Oforts
Magyar	http://hu.wikipedia.org/wiki/Rézkar
Nederlands	http://nl.wikipedia.org/wiki/Ets
日本語	http://ja.wikipedia.org/wiki/アール
Norsk (bokmål)	http://no.wikipedia.org/wiki/Etsning
Polski	http://pl.wikipedia.org/wiki/Akwaforta
Русский	http://ru.wikipedia.org/wiki/Дъбля̀дъ̀дъ̀дъ̀
Slovenčina	http://sk.wikipedia.org/wiki/Lept
Suomi	http://fi.wikipedia.org/wiki/Etsaus
Svenska	http://sv.wikipedia.org/wiki/Etsning_(konst)
Українська	http://uk.wikipedia.org/wiki/Дъбля̀дъ̀дъ̀дъ̀
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