What is Engraving?

Engraving is the practice of incising a design onto a hard, usually flat surface by cutting grooves into it with a burin. The result may be a decorated object in itself, as when silver, gold, steel, or glass are engraved, or may provide an intaglio printing plate, of copper or another metal, for printing images on paper as prints or illustrations; these images are also called "engravings". Engraving is one of the oldest and most important techniques in printmaking. Wood engraving is a form of relief printing and is not covered in this article.

Engraving was a historically important method of producing images on paper in artistic printmaking, in mapmaking, and also for commercial reproductions and illustrations for books and magazines. It has long been replaced by various photographic processes in its commercial applications and, partly because of the difficulty of learning the technique, is much less common in printmaking, where it has been largely replaced by etching and other techniques.

"Engraving" is also loosely but incorrectly used for any old black and white print; it requires a degree of expertise to distinguish engravings from prints using other techniques such as etching in particular, but also mezzotint and other techniques. Many old master prints also combine techniques on the same plate, further confusing matters. Line engraving and steel engraving cover use for reproductive prints, illustrations in books and magazines, and similar uses, mostly in the 19th century, and often not actually using engraving. Traditional engraving, by burin or with the use of machines, continues to be practiced by goldsmiths, glass engravers, gunsmiths and others, while modern industrial techniques such as photoengraving and laser engraving have many important applications. Engraved gems were an important art in the ancient world, revived at the Renaissance, although the term traditionally covers relief as well as intaglio carvings, and is essentially a branch of sculpture rather than engraving, as drills were the usual tools.

Modern Hand Engraving

Because of the high level of microscopic detail that can be achieved by a master engraver, counterfeiting of engraved designs is well-nigh impossible, and modern banknotes are almost always engraved, as are plates for printing money, checks, bonds and other security-sensitive papers. The engraving is so fine that a normal printer cannot recreate the detail of hand engraved images, nor can it be scanned. In the Bureau of Engraving and Printing, more than one hand engraver will work on the same plate, making it nearly impossible for one person to duplicate all the engraving on a particular banknote or document.

The modern discipline of hand engraving, as it is called in a metalworking context, survives largely in a few specialized fields. The highest levels of the art are found on firearms and other metal weaponry, jewelry, and musical instruments.

In most commercial markets today, hand engraving has been replaced with milling using CNC engraving or milling machines. Still, there are certain applications where use of hand engraving tools cannot be replaced.

Machine Engraving

In some instances, images or designs can be transferred to metal surfaces via mechanical process. One such process is roll stamping or roller-die engraving. In this process, a hardened image die is pressed against the destination surface using extreme pressure to impart the image. In the 1800s pistol cylinders were often decorated via this process to impart a continuous scene around the surface.

Computer-Aided Machine Engraving

Engraving machines such as the K500 (packaging) or K6 (publication) by Hell Gravure Systems use a diamond stylus to cut cells. Each cell creates one printing dot later in the process. A K6 can have up to 18 engraving heads each cutting 8.000 cells per second to an accuracy of .1 µm and below. They are fully computer-controlled and the whole process of cylinder-making is fully automated.
It is now common place for retail stores (mostly jewellery, silverware or award stores) to have a small computer controlled engrave on site. This enables them to personalise the products they sell. Retail engraving machines tend to be focused around ease of use for the operator and the ability to do a wide variety of items including flat metal plates, jewellery of different shapes and sizes, as well as cylindrical items such as mugs and tankards. They will typically be equipped with a computer dedicated to graphic design that will enable the operator to easily design a text or picture graphic which the software will translate into digital signals telling the engraver machine what to do. Unlike industrial engravers, retail machines are smaller and only use one diamond head. This is interchangeable so the operator can use differently shaped diamonds for different

finishing effects. They will typically be able to do a variety of metals and plastics. Glass and crystal engraving is possible, but the brittle nature of the material makes the process more time-consuming.

Retail engravers mainly use two different processes. The first and most common 'Diamond Drag' pushes the diamond cutter through the surface of the material and then pulls to create scratches. These direction and depth are controlled by the computer input. The second is 'Spindle Cutter'. This is similar to Diamond Drag, but the engraving head is shaped in a flat V shape, with a small diamond and the base. The machine uses an electronic spindle to quickly rotate the head as it pushes it into the material, then pulls it along whilst it continues to spin. This creates a much bolder impression than diamond drag. It is used mainly for brass plaques and pet tags.

With state-of-the-art machinery it is easy to have a simple, single item complete in less than ten minutes. The engraving process with diamonds is state-of-the-art since the 1960s.

Today laser engraving machines are in development but still mechanical cutting has proven its strength in economical terms and quality. More than 4,000 engravers make approx. 8 Mio printing cylinders worldwide per year.