Lampworking is glassworking using a torch to melt and shape the glass

From Wikipedia, the free encyclopedia

It is also known as **flameworking** or **torchworking**, as the modern practice no longer uses oil-fueled lamps. Although the art form has been practiced since ancient times, it became widely practiced in Murano, Italy in the 14th century. In the mid 19th century lampwork technique was extended to the production of paperweights, primarily in France, where it became a popular art form, still collected today.

Early lampworking was done in the flame of an oil lamp, with the artist blowing air into the flame through a pipe. Most artists today use torches that burn either propane or natural gas for the fuel gas, with either air or pure oxygen (which can be produced by an oxygen concentrator) as the oxidizer. It was not until the late 1960s that lampwork became recognized as a serious art form by German born lampwork glass artist Hans Godo Frabel who utilized his scientific glassblowing training to create relatively large pieces of lampwork glass art in borosilicate.

Glass selection

Lampworking can be done with many types of glass, but the most common are soda-lime glass, sometimes called "soft glass" - and borosilicate glass, often called "hard glass. Leaded glass tubing was commonly used in the manufacture of neon signs, although its use has been fading due to environmental concerns and health risks.

Different colors of glass must be carefully selected for compatibility with each other, both chemically (more of a concern with soft glass than borosilicate)and in terms of coefficient of thermal expansion (COE){Also used is CTE for Coefficient of Thermal Expansion}. Glass with incompatible COE, mixed together, can create powerful stresses within a finished piece as it cools, cracking or violently shattering the piece. Different major types of glass, e.g., borosilicate and soda-lime glass, are **not** compatible with each other. Chemically, some colors can react with each other when melted together. This may cause desirable effects in coloration, metallic sheen, or result in an aesthetically pleasing "web effect". It also can cause undesirable effects such as unattractive discoloration, bubbling, or devitrification.

Borosilicate glass is considered more forgiving to work with, as its lower COE makes it less apt to crack during flameworking than soda-lime glass. However, it has a narrower working temperature range than soda-lime glass, has fewer available colors, and is considerably more expensive. Also, its working range is at higher temperatures than soda-lime glass, requiring larger torches and the use of oxygen instead of air. In addition to producing a hotter flame, the use of pure oxygen allows more control over the flame's oxidizing or reducing properties, which is necessary because some coloring chemicals in borosilicate glass react with any remaining oxygen in the flame either to produce the desired final color or to discolor if extra oxygen is present.

Tools

Tools for lampworking are similar to those used in glassblowing. Graphite or steel pads, rods, and other shapes are used for **marvering** the glass. Brass, graphite, or wooden molds (usually of apple or cherry wood) can be used to mold the hot glass. Tungsten picks can be used to drag glass around on the surface, or to bore a hole through a piece. Steel **jacks**, usually coated with beeswax, are used to neck down or cut off a

piece. The immense importance of graphite in glassblowing is due to its incredibly low density (very soft) and thus its ability to absorb heat, this allows the graphite to touch the molten glass with minimal temperature contrast between the metal and glass. The graphite absorbs the heat energy so there is minimal shock to the glass, which is the ultimate goal. There is a wide array of glass blowing tools made of graphite for this reason.

General methods

After designing a piece, a lampworker must carefully plan how to construct it. Once ready to begin, the lampworker slowly introduces glass rod or tubing into the flame to prevent cracking from thermal shock. The glass is heated until molten, wound around a specially-coated steel mandrel, forming the base bead. It can then be embellished or decorated using a variety of techniques and materials. All parts of the workpiece must be kept at similar temperatures lest they can or shatter. Once finished the piece must be annealed in an oven to prevent cracking or shattering.

Annealing, in glass terms, is heating a piece until its temperature reaches a stress-relief point, that is, a temperature at which the glass is still too hard to deform, but is soft enough for internal stresses to ease. The piece is then allowed to heat-soak until its temperature is uniform throughout. The time necessary for this depends on the type of glass and thickness of the thickest section. The piece is then slowly cooled at a predetermined rate until its temperature is below a critical point, at which it can't generate internal stresses, and then can safely be dropped to room temperature. This relieves the internal stresses, resulting in a piece which should last for many years. Glass which has not been annealed may crack or shatter due to a seemingly minor temperature change or other shock.

Types of Glass

Most lampworkers use rods of glass 7–8 mm in diameter, though pre-made stringers are available in 1–3 mm sizes, or rods of 15 mm or more. Sheet glass can be cut with tools into strips, though it is easier to manipulate if attached to a rod first. Glass is also available in particles of various sizes (frit or powder), which is typically used for surface decorations in lampworked beads. Many manufacturers who once only sold their glass in sheet or very thick rod now provide rods for lampworking use. Window glass is usually not used, as it is not formulated for flameworking and there is little variation of color available.

Soda lime glass

The most popular glass for lampworking is soda-lime glass, and is available pre-colored. Soda-lime glass is the traditional mix used in blown furnace glass, and lampworking glass rods were originally hand-drawn from the furnace and allowed to cool for use by lampworkers. Today soda-lime, or "soft" glass is manufactured globally, including Italy, Germany, Czech Republic, China and America.

Lead

In addition to soda lime glass, lampworkers can use lead glass. Lead glasses are distinguished by their lower viscosity, heavier weight, and somewhat greater tolerance for COE mismatches.

Borosilicate

Beadmakers can use borosilicate glass, a very hard glass requiring greater heat. This is laboratory glass, such as Pyrex. At one time, soft (soda lime and lead) and hard (borosilicate) glasses had distinctly different

looking palettes, but demand by soft-glass artists for the silver strike colors on the one hand, and the development of the bright, cadmium based `crayon colors' in the boro line on the other, has diminished the distinctions between them.

Fuming is a technique that has been developed in the past 15 years by Bob Snodgrass. This method consists of heating silver or gold in the flame, so that the metals vaporize or "fume" microscopically thin layers of particles onto the glass. These particle stick to the hot glass surface changing its color with interesting effects. Silver turns clear glass into a yellowish color, giving shades of blues and greens when backed with a dark color, while gold turns clear glass shades of pinks and reds. The precious metal coating becomes increasingly visible the more the glass is fumed.

Brief history of modern lampworked beads

Lampworked beads (with the exception of Asian and African beadmaking) have generally been the provenance of Italian, and, later, Bohemian lampworkers for the last four hundred years or so who kept the techniques secret. Thirty or so years ago, some American artists started experimenting with the form. Their early efforts, by today's standards, were crude, as there was almost no documentation, and none of the modern tools. However, they shared their information, and some of them started small businesses developing tools, torches and other equipment.