

Lampworking: a Brief Overview

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Lampworking -- a type of glasswork that uses a gas fueled torch to melt rods and tubes of clear and colored glass. Once in a molten state, the glass is formed by blowing and shaping with a variety of tools and hand movements. 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 lamp work technique was extended to the production of paperweights, primarily in France, where it became a popular art form, still collected today.

Lampworking differs from glassblowing in that glassblowing utilizes a blowpipe to inflate a glass blob known as a gob or gather, thereby inflating it by blowing air into the blowpipe, whereas, lampworking manipulates glass either by the use of tools, gravity, or by blowing directly into the end of a glass tube.

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, or in some countries butane, for the fuel gas, with either air or pure oxygen (which can be produced by an oxygen concentrator) as the oxidizer.

Lampworking is used to create various artwork, including figurines, trinkets, curios, Christmas tree ornaments, beads and much more. It is also used to create many scientific instruments as well as glass models of animal and botanical models that so closely mimic the real thing, they are virtually indiscernible from the actual thing, save the fact that they are not living.

Glass -- 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.

Rod vs. Sheet -- 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.

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.

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.

Tools -- Tools for lampworking are similar to those used in glassblowing. Marvers - flat surfaces used to roll glass upon in order to shape, smooth or consolidate applied decoration, typically made of graphite or steel, rods, and other shapes are used to marver or shape 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 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.

Beadmaking -- 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. The coating is an anti-fluxing bead release that will allow the bead to be easily removed from the mandrel. It can then be embellished or decorated using a variety of techniques and materials. All parts of the work piece must be kept at similar temperatures lest they 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.

Basic "Wound Bead" technique --

- **Preparing the mandrel** - The beadmaker starts by dipping a mandrel, or wire (stainless steel welding wire, cut into lengths) into a clay based substance (commonly referred to as "bead release") and letting it dry.
- **Heating rod and mandrel** - The flameworker selects rods of glass to heat in the flame of the torch. When both glass and mandrel are sufficiently warm, the beadmaker starts rotating the mandrel while allowing the glass to wind upon it.
- **Shaping the bead** - Beads are shaped using a combination of heat, gravity and tools such as graphite paddles, mashers, tweezers, and picks. Presses to create shapes and indent patterns into the glass are also used.
- **Decorating the bead** - Beads can be decorated by melting stringers, or fibers of glass on the surface, creating dots or lines. With a sharp pointed tool, feathers, hearts or other designs may

be produced. Metal decorations of copper, silver, gold, palladium and platinum are applied as metal leaf, wire, mesh or fuming.

- **Striking** - If silver based colors are used (striking colors), the bead must be heated for a few moments in the torch flame or kiln to allow crystals to reform in the glass. This temperature is slightly above the stress relief point.
- **Annealing** - Once completed, beads should be heated to 940°-1050°F (depending on glass type), until the piece reaches its "stress relief point", held at that temp for a short time, then slowly cooled to avoid thermal shock.

Cold working - The cooled bead can be further decorated. Standard cold working techniques can be employed such as sandblasting, faceting and polishing. Etching the finished piece with acid leaves a matte finish.

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. This group eventually formed the basis for the International Society of Glass Beadmakers.

*Wikipedia contributors, "Lampworking," *Wikipedia, The Free Encyclopedia*, <http://en.wikipedia.org/w/index.php?title=Lampworking&oldid=309097233> (accessed August 20, 2009).