

Going Pyro 1

Lampworked Glass – AKA Beadmaking

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How to say Glass

English – Glass, Arabic – Zoogag, Bengali – Sheesha, Bulgarian – Stakio, Castellano – vidrio, Mandarin – Boli, Czech – Sklo, Egyptian – Zuggag, Estonian – Klass, Finnish – Lasi, French – Verre, Fresian – Gles, Gaelic – Gloine, German – Glas, Greek – Gyali, Hebrew – Zchuchit, Hindi – Kach, Iceland – Gler, Italian – Vetro, Latvian – Stikls, Maltese – Hgleg, Romanian – Sticla, Welsh – Gwydr

Sven's Rules of Glass

1. **Everyone has something to offer the art of glass bead making.**
2. **It's only a mistake if you fail to learn from it.**
3. **We are all bad judges of our own work.**

Safety Rules

1. Do not do glass if you are not feeling 100%.
2. Make sure you and your environment are fire safe.
(no artificial fabrics, nothing flammable on the table or floor)
3. Turn off the torch if you are not using it or have to leave it. Even for a moment.

Glass facts

- The earliest man-made glass objects are believed to be beads and date from around 3500 BC with finds in Egypt and Mesopotamia.
- Is a poor conductor of heat – therefore we have to heat all sides evenly.
- Because glass is a poor conductor of heat it will cool from the outside in (compressing the hot core which is still trying to expand) and that stress is further induced into the glass as part of the manufacturing process. Glass can and will crack as it cools. To prevent this you have 2 choices in the cooling process.
 - Slow cooling – cool the bead slowly enough that the stresses induced by cooling and those already inside the bead are not high enough to cause the bead to crack. (Fiber blanket, Vermiculite, etc)
 - Annealing – hold the bead at a temperature high enough to allow the internal stresses to settle and dissipate. Then cool the bead slowly enough that no further stresses are induced in the bead. (Kiln required)

- Glass expands as it heats, different mixtures expanding at different rates – therefore we have to make sure all the glass we are using in a single piece has a compatible COE (Coefficient Of Expansion aka expansion) or use less than 10% of the non-compatible glass and hope the stress doesn't crack the piece. A low or high COE also relates directly to its ability to resist thermal shock.
 - Bullseye – 90 COE
 - Effetre (Moretti) – 104 COE
 - Vetrofond – 103 COE
 - Double Helix – 104 COE
 - Pyrex – 32 COE
 - Northstar – 33 COE
 - Float Glass (window) – 83-87 COE (varies by manu. and batch)

- Not all glass is the same.
 - Soda Lime Glass – what most people refer to as basic glass, created by mixing Soda, Lime and Silica and pouring it onto a bed of molten tin and pulling off a continuous sheet. Note the 1 side of it always has a slight shine to it from the tin.
 - Float Glass - Basic window glass, created by taking basic Soda Lime Glass and pouring it onto a bed of molten Tin and pulling off the result a continuous sheet. Note the 1 side of it always has a slight shine to it from the tin.
 - Borosilicate Glass – Also known as Pyrex this type of glass was created by Owens Corning and is primarily composed of Boron Oxide and Silica and is most commonly used in household cookware, laboratories and in glass sculpture due to its low COE.

My Basic Preferred Tools

Eye Protection - Didymium glasses, Aur92, or other protective glasses.

Hot glass emits a flare of light in the torch flame (sodium flare) and a lot of infrared heat. As your eyes do not have pain sensors, you can injure your eyes without knowing it. (i.e. Glassblower cataracts) These glasses block the specific wavelength of light from the sodium flare but allow all other light to pass through. This means that they protect your eyes from small shards of glass and the light flare and heat but still allow you to tell what colors of glass you are working with. Basic welders' glasses also do most of this but they also turn the entire world green or grey.

Heat source -

Fuel + Air – Hothead torch ~\$30~

This is essentially a modified plumbing torch that can run off of propane or MAPP gas (Propadiene). It runs at 3800 degrees for Propane and 3,670 degrees with MAPP. However the 2 gases burn differently and you will often see long discussions about the “better” gas. If this is your torch use the gas that works for you.

Fuel + Oxygen – Nortel Minor or National 8m ~\$170~

These are purpose built surface mix beadmaking torches. They are called surface mix torches because the fuel and oxygen stay separated until they both emerge at the nozzle of the torch. They are commonly run off of propane or natural gas. These are both great starter torches and many people work their entire careers without ever needing to upgrade their torch. The only advantage of the National 8m is that it can be physically upgraded with interchangeable tips and the Minor cannot.

Mandrels – This is the metal rod that you make the bead on.
I recommend using Stainless Steel TIG Welding Rod 308L. Less available but harder is 316L and even better is 347 or 347L. Each is designed to be stay harder at higher temperatures.

Bead Release – Essentially kiln wash, this is a special mix of clay designed to hold firmly to the mandrel and yet still allow you to remove the bead after it has been created.

Marvering pad (aka Marver) – a metal, graphite or soapstone surface that you use to shape the bead.

Pick - Small metal pick or point in a handle. The best ones are made of tungsten.

Mashers - A parallel set of surfaces with which you can squeeze the glass.
(i.e. barbecue tongs, pliers)

Tweezers - Basic pair of tweezers about 6 inches long. Several pairs in assorted sizes can help.

Jewelry Pliers (holding) – The press to open kind with wooden handles. This allows you to use short pieces of glass or stringer without getting your hands too close to the flame.

Dull knife - Used for pressing shapes into the glass. (i.e. Butter knife)

Cup of water- For dipping your tools to prevent them from getting too hot.

Fire extinguisher- Do you really want to be on fire or worse yet the cause of one?

Natural Fiber clothing- Natural fibers smolder on contact with high heat.
Artificial fibers melt and burn to you if you're wearing them. Severe Burns!

Secure surface- The torch can move, make sure it doesn't.

Making a Bead

Beads have been made in many ways throughout history but the way we will be working with is the modern method using a fuel + air torch. Period methods varied and I encourage you to research them but as this is a practical class we will focus on how to do it today at home.

The basic process of beadmaking is easy to say but hard to perform.

1. Melt the glass in the torch flame
2. Drip it on a mandrel that is below the flame and slowly spinning. Gravity and surface tension will create the basic “bead” shape.
3. Further shape the bead using fireproof tools while keeping it in a semi molten state (taffy-like) before cooling it.

There are as many exact methods to do this as there are beadmakers, so if my method doesn't work for you and someone else's does or you have invented your own method, by all means USE IT. There are very few hard and fast rules. One is Don't Burn Yourself. After that we start to disagree as a lot of glasswork is based on your individual feel and understanding of how the glass works for you. We can guide you on the path but you still have to walk it and gain that understanding for yourself.

As a right-handed semi-ambidextrous person, my instructions are written as such. Please change them as needed for your situation.

The Steps

Take a piece of source glass in your right hand and holding it about 6-8” from the tip begin passing it through the flame 4-6” from the torch. Rotate it slowly so that on each pass a different side of the glass is being heated by the torch. When the edges of glass begin to glow you can just leave it in the torch flame and keep rotating.

NOTE: Do not be surprised if small bits of glass break or “spit” off the tip of the glass. This means that either you are heating it too fast or that there were stresses already in the glass. These bits almost always jump straight off the end of the rod so angle the rod slightly away from yourself while heating it.

Heat up about 1” of glass to the point where it is hard to keep it from dripping off. If it does get uncontrollable just let it fall back on the rod and heat up the tip of the now doubled rod.

With your left hand, pass the coated area of the mandrel through the flame. With your right hand, keep the glass rod hot in the flame. The idea is to preheat the area of the clay where you want to make the bead.

Hold the source glass rod vertical in your right hand like a pencil so that the tip of the heated area is in the flame.

Hold the mandrel horizontal under the flame on the side of the torch away from you such that if any glass drips off the source glass rod it will be caught by the mandrel. In fact, that's the idea.

Spin the mandrel slowly away from you as you look at it. (if you looked it end-on it would be rotating clockwise) Try to heat the glass so that it begins to fall onto the mandrel. Please note that moving the

glass closer than about 4 inches makes the glass cooler NOT hotter. (It just runs out of air too close to the torch)

As the glass drips onto the mandrel, do not spin the mandrel too fast. The torch is melting the glass off the source rod, not pulling it. So if you feel that you are pulling on the source glass at all, slow down your spinning, heat up the source glass more, let the torch heat up the glass to a more liquid state.

When you have enough glass on the mandrel pull the source glass away from the mandrel so that you have a thin thread of glass. Then hold that thread of glass in the hottest part of the flame. It will quickly “flame cut” it.

Put the source glass rod down with the hot end away from you.

Begin rotating the bead the other direction in the flame until you have the shape you want. Feel free to use the tools or other surfaces to help shape the bead. **Play.**

Things to remember

The glass will always flow down and towards the hottest part of the bead.

Keep spinning the bead.

Don't let it get too cool.

Always dip your tools in water when you use them. (hot glass sticks to hot metal!)

Decorating the bead

When you get right down to it the techniques of bead decorating are very similar to the techniques of cake or fingernail decorating. You're just doing it at 1500 degrees.

In general terms we are talking about....

Frit

Dots

Stripes aka stringer

Latticino (aka twisties, complicated stringer)

Stacking of Dots and Stripes

Raking of Dots or Stripes

Millefiori

Surface shaping

3-D shaping

- Frit – Smashed up multicolored bits of glass. Roll your bead in it and melt them in. Voila! Instant art. It's period!
- Dot – To make a dot just add a small bit of glass to the surface of the bead. You can melt it in or not.
- Stripe – To take a thin “stringer” of glass and lay it down on the surface of the bead. You can melt it in or not.
- Stacked Dots – Just what it says. Make a dot. Make another dot on top of the first so that the first dot shows through. A small black dot on white looks like an eye.

- Raking of Dots or Stripes – Raking is the process of taking a small metal pick and dragging it through 1 or more dots or stripes. This is the same process as frequently executed on cakes to create a set of stacked “V” shapes.
- Millefiori – Small cut cylinders of glass with multiple colors of glass contained inside. These can be placed on a bead and melted in to instantly add decorative elements.
- Surface shaping – such a simple term covers everything you can do to change the shape of a bead. Want it square? Rectangle? Triangle? Heart? Face? It’s all just surface shaping. Grab your tools and the sky is the limit. Add glass where you want and press it in or pull it off where you don’t want it. Practice makes perfect.
- 3-D shaping – Creating shapes out of glass. Surface shaping taken to the next step. Make a goddess bead. (much easier with Borosilicate glass. Not covered in this class.) Play around with 2 rods and try to make a recognizable shape. That’s 3-D shaping.

Pulling stringer

Stringer is a long thread or string of glass that is most commonly used to decorate a glass bead with dots or stripes. You use them a lot and consume them quickly. Creating them is good practice at controlling how you heat your glass.

There are several methods, this is just my favorite:

Heat up a blob of glass about ½” in size. Practice will tell you if it it’s large enough for the size of stringer you want to pull.

Pull it out of the flame and let it cool just enough to form a slight skin on the glass.

Take your tweezers and pinch a small bit of glass and begin pulling it out of the mass. If it’s too thin pull slower. If too large pull faster.

When it gets too stiff or you get to the length you want hold it momentarily in midair for it to cool and stiffen. Then flame cut the stringer as appropriate. (a really long one you may want to cut in more than 1 place. 12” long is about max)

Place the pieces on the table and give them about 3 minutes to cool before touching them. Make sure to dip your tweezers in the water to cool them and to get the waste glass off of them.

Sources

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