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Vitrigraph Melts

Watching molten glass flow from beneath a kiln is a great way to see how glass behaves at different temperatures. It's fully molten at the beginning when it first leaves the pot, hardening but still soft enough to manipulate an inch or so down, and cooled enough to harden in a couple of inches. This is exactly how glass behaves at different fusing temperatures in a kiln. The pour starts off at full fuse temperature, cools to contour fuse, then to tack fuse, further to slump or drape temperature and ultimately cooled enough to be no longer hot enough to bend. It also provides an opportunity to see how different colors and different viscosities of glass behave.

Vitrigraph Myths

I'm sure if more people knew more about what vitrigraphs can do, more people would be using them. Perhaps they think vitrigraphs are difficult or maybe they think all they're for is making stringers or rods? Some popular myths about vitrigraphs are:

Converting a kiln to use as a vitrigraph makes it unusable as a conventional kiln. Not so. Just drill a hole in the bottom of any kiln and it can be used as a vitrigraph. To use it as a regular kiln just either put a plug in the hole or cover the hole with a piece of ceramic tile.

It's a lot of work to set up a vitrigrah. Not so. The higher it is elevated the easier it is to work beneath it but even just stood up on short posts is enough.

A vitrigraph requires a lot of space. It's handy to have room to walk out to pull the glass stream but there's no reason you can't just pull it straight down.

Vitrigraphs are just for making stringers and rods. They're great for that but you can buy stringers and rods. Where vitrigraphs are really special is for making shapes you can't buy. Fascinating organic shapes that can be used to make thoroughly unique and original projects.

Making a Vitrigraph

Making a vitrigraph is as simple as taking any kiln, drilling a hole in the floor and elevating it so you can work beneath it.

Kiln with hole drilled in its floor.

Kiln on steel pipes spanning wooden stools.

Glass Campus

Vitrigraph Melts

Standing your vitrigraph on a table gives you the option of either letting the melt drop down onto the table or drawing it out along the table.

Kiln on metal stand designed for a table saw. It's sitting on a piece of fireproof cement board.

Kiln with stand bolted to 6 ft tall metal angle bar. Dropping stream of glass into a piece of stovepipe is a great way to make long straight stringers.

Drop Surface

The molten glass pouring out is still hot several feet below the kiln. It's handy if you have it drop onto something fireproof like cement board or sheet metal but if you keep a careful eye on it, you can drop onto plywood.

Glass Campus

Vitrigraph Melts

Glass dropped onto plywood. You can see the burn marks where the hot glass hit the wood.

Safety

The glass is coming out at 1700° F (925° C). That's more than hot enough to dissolve any flesh it contacts. Take great care to not touch it. Either wear gloves or use tools that allow you to handle the glass without it touching your skin. If you decide to work with gloves, take care to not rely too heavily on them. The glass is hot enough to even scorch welding gloves. If you must touch the glass at all with gloves, do so only when it is at least 24" (60 cm) from the pot and even then only on the thinnest parts. It takes a while for the glass to cool enough to safely handle. If you're not positive it's been long enough, wait longer.

Unless you're thrilled with the idea of creating a pattern of scar tissue on your hands from having the flesh seared by hot glass, take care to not touch the glass.

Do not leave the kiln unchecked for very long when it's firing. Sometimes the pot inside can crack or turn over and make a huge mess as it drains the full contents onto the floor of the kiln.

Always wear safety glass when pulling glass from a vitrigraph. Small bits of hot glass sometimes comes flying off when you can the melt stream. A little scar on your face is no big deal but if you catch a piece in your eye, eye patches are no longer considered a cool fashion accessory.

The Pot

Earthenware pots are inexpensive and work well for melts but those made from low quality clay are highly susceptible to cracking when fired full of molten glass. Avoid any from Mexico or China. The best are from Italy and can be reused multiple times.

2.5 cup capacity narrow base earthenware pot. This shape pot have proven to be reliable for more than a dozen resuses.

Glass Campus

Vitrigraph Melts

4 cup capacity wide base earthenware pot

Ceramic or porcelain pots are more likely to stand up to multiple firings than earthenware

Steel pots will spall extensively at melt temperatures leaving flecks of metal embedded in the molten glass in every firing.

Tall thin pots will cool more safely than low wide ones. You can just turn the kiln off and let it cool naturally it you use a tall thin pot but should program it to cool down at about 400F degrees per hour if you used a wider shape pot. A wider bottom pot will retain enough glass to retain heat on the bottom of the pot which can cause a thermal shock crack as the sides of the pot cool. The best is a ceramic pot curved inside but with a flat bottom outside to hold the pot firmly in place during the melt.

Earthenware pot cracked after one use

A larger pot of glass will take longer to melt than a smaller pot.

If the bottom of the bottom does not sit firmly against the kiln floor over the hole, there's a good chance the glass will not melt in a straight stream down but will melt down through the hole in the pot and spread out across the bottom of the pot.

If the pot sits on the kiln floor, the glass won't melt as fast as if was elevated in some way to allow air heated air beneath it. A kiln with side elements will melt the glass quicker than one with only lid elements

Reusing the Pot

You can use a different pot for each different color you melt to ensure you don't contaminate your pour with some color from the previous pour or you can just keep reusing the same pot for different colors. The beginning of the pour will have some of the old color but that quickly pours out and you'll have just the new color.

Glass Campus

Vitrigraph Melts

Hole Size

The larger the hole in the pot, the thicker the melt stream will be and the faster the pot will empty.
A test firing with a 1.5 cup capacity pot with ½" diameter hole drained in 60 minutes but a much larger 4 cup capacity pot with a ¾" diameter hole drained in 45 minutes.

Firing Schedule

500°F dph (260°C) to 1700° (925°C) hold 60 min *
* longer hold for larger pots

You can allow the kiln to crash cool but that risks causing the pot to crack. If you hope to reuse the pot, it's wise to program a cooling ramp the same as the heating ramp.

TIME ALLOWANCE

If you choose to ramp at FULL it will usually take about 2 to 2.5 hours to reach the desired 1700° F (925° C).

The Pour

The pour will start slow and pick up speed as the glass reaches full melt in the pot.

Some colors will pour faster than others.

It will start with larger elongated pieces which, once formed will drop quickly and pull the glass behind it into thread thin stringers.

If you hold the end of the glass with pliers to prevent it from dropping, it will become thicker.

If you grab the end of the glass with pliers and steady walk away from the kiln, you can pull long consistent size stringers. With a little practice you can produce straight uniform thickness strands.
When the glass first leaves the pot it's glowing bright and molten soft. It hardens quickly as it drops. If you take metal rods, you can manipulate the stream of glass to desired shapes – and even tie it into knots with a little practice. A few minutes playing with it will allow to identify the "soft spot" where the glass is still soft enough to be manipulated and the just below it "firming spot" where the glass is becoming firm enough it will not longer bend.

You can control the size of the stream of glass by controlling the tension on the glass. If you pull, you will create a thinner stream. If you hold back to restrict the melt drop, you will create a thicker stream.

Some things to consider:

- The longer the drop, the more varied the thickness of the stream will be.
- Large holes in the pot will produce thicker streams.
- A larger pot will take longer to heat up enough for the melt to start.
- Darker colours melt faster than lighter colors.

Manipulating the soft stream to

Glass Campus

Vitrigraph Melts

create wild and crazy shapes.

Winding soft glass around a metal pipe to create coils.

Pulling soft glass along an aluminum rain gutter to draw out long uniform thickness stringers.

Colors

Usually if you melt mixed colors in the pot, the colors will begin to blend with the darkest color dominating all lighter colors. That is especially so if you mix opal and transparent glass. The opal will dominate. Transparent red, orange, and yellow tend to opalize when melted.

At full melt temperature, glass does things it does't do at fuse temperature. For example, red glass will turn slightly brown. I did an experiment with a mix of equal parts opal red, transparent red, transparent orange, and transparent yellow that produced a consistent red/orange opal pour. A mix of equal parts opal white, light blue and medium blue produced an opal blue melt. An experiment with equal parts of white and black produced solid black.

Expect the unexpected. You can be sure to find many interesting and surprising results.

Shapes

With a bit of practice you can make your own rods and stringers whatever size you like but you can always buy rods and stringers. The special thing about a vitrigraph is how it can allow you to make shapes and forms you can't make any other way.

Torpedo shapes created by alternating between allowing a thick melt to build up and drop from the pot followed by a drop stream of stringer.

Glass Campus

Vitrigraph Melts

Viscosity

The size of the stream is relative to the viscosity of the glass melted. Transparent glass produces thinner streams then opal glass.

Concerns

Don't expect molten glass to flow like water. It's more likely to ooze like lava.

The streams coming out must be handled carefully. The molten glass has not been annealed so it's unusually brittle.

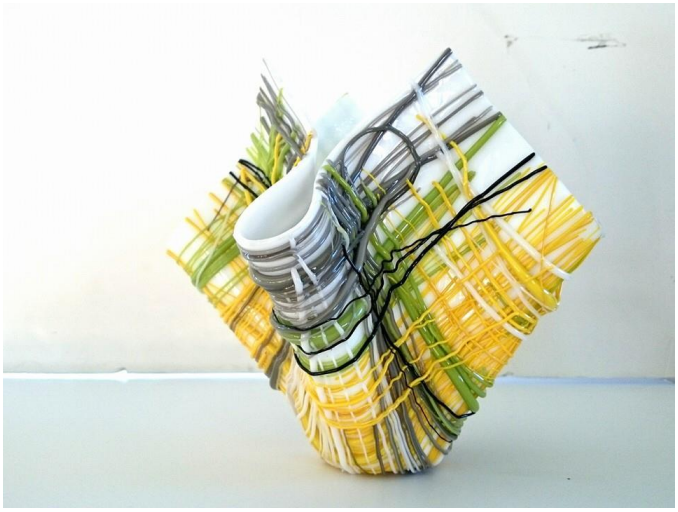
Do not expect the colors to remain true. They will at kiln fusing temperatures but many colors will change at the higher temperatures used for a vitrigraph melt. If you combine colors in a mixed color pour, take care to not mix colors that react with each other.

The glass is hot enough to seriously burn you. It's a good practice to avoid touching it until it has sat for an hour or so.

Some Projects

"Birdsnest" bowl

"Thatch" tray



Wavy stringers on handkerchief vase
Compliments Michelle Frost at Frosty by Design.