

Step-by-step: Glue-chipped glass

Recreate this stunning century-old effect

I first encountered glue-chipped glass in 1982 in Boise, Idaho. Noel Weber assembled an energetic group of craftsmen for a weekend Letterheads meeting billed as the “Boise BBQ.” Bob Mitchell made the trip from Aspen, Colorado, and enlightened us on the necessary steps, equipment and supplies for a unique new sign-making process. The process is an old one, but prior to the Boise meeting, about the only people using it were stained-glass artists. They usually bought sheets of chipped glass from their supplier,

rather than using the process to chip a design into otherwise clear glass.

Information on the process was almost nonexistent, and what was available was sometimes misguided. It took some experimentation to figure out a method that would deliver fairly consistent results. Bob went on to write a book for *SignCraft*, *The Art of Glue-Chipped Glass Signs*, which is now out of print. The process, as we learned it, went something like this:

Clean the glass and apply sandblast stencil.



Figure 1. Apply the asphaltum evenly.



Figure 2. Apply the mask over the dry asphaltum.



Figure 3. Mike blasts small glass pieces in a blasting cabinet.



Figure 4. Lightly sandblast the exposed areas.

Draw or pounce the design onto the stencil in reverse. Cut and peel out the areas to be chipped. Lightly sandblast the exposed areas. Mix the glue using a basic formula, heat and pour it onto the glass, covering either the entire piece or the exposed areas. Let the glue set up until it can be cut with a stencil knife, but not reheat. Cut around all the stencil and remove all remaining stencil, leaving glue only in the etched areas. Let set overnight. As the glue dries, it shrinks and takes tiny layers of glass with it, leaving the chipped surface.

Sounds simple enough, right? This process is still being used by sign people and is worth considering for certain projects—especially large ones. But there is another way! Used extensively at the turn of the century, this process was patented by Rawson & Evans, Chicago, Illinois, and was held as a closely guarded secret. Thanks to some serious investigation, research and experimentation by Rick Glawson, this method has been rediscovered.

This process is based on a “secret” ingredient called asphaltum and one of the basic

rules of nature—oil repels water. Asphaltum is available from specialty sign suppliers. It’s black and similar in consistency to roofing tar. One of the beauties of the product is that it dissolves with paint thinner even after it’s dry—which is a key factor in this version of the process.

Asphaltum was used quite a bit by turn-of-the-century sign painters. It was mixed with varnish to create shades and shadows. Mixed with oil size, it could be used to create multiple tones of gold when reverse gilding on glass. It was used as an acid resist when etching glass.

The asphaltum process First the glass is cleaned and coated with asphaltum. One coat is enough. It can be applied with a foam brush or other cheap brush (Figure 1). Apply it as evenly as possible—thick areas will take longer to blast away.

Now you’re ready to apply the mask. Computerized cutters speed the process by cutting the design in reverse to the exact size. We cut ours from GerberMask™, but other brands of mask should work. If you plan to



Figure 5. Masking removed and glue ready to mix



Figure 6. Use a small squirt bottle to apply the glue to the frosted areas that will be chipped.



Figure 7. Set the piece out of the way in a warm area.



Figure 8. Chipping will begin as the glue dries.



Figure 9. The glue pulls the glass off in small chunks.



Figure 10. In most cases, the glass will be chipped within eight hours.



Figure 11. Mineral spirits are used to wash the asphaltum from the glass.



Figure 12. Flood the thinner over the glass with a small camel-hair brush.

do deep blasting, use sandblast stencil for the mask, but, otherwise, the thin GerberMask is sufficient. Peel the areas of the design that you plan to etch and chip, apply the transfer tape, then carefully apply it to the asphaltum-covered glass (Figure 2).

Lightly sandblast the exposed areas (Figures 3 and 4). Remove the remaining stencil, leaving only asphaltum-coated smooth glass areas and the frosted areas that will be chipped. It doesn't seem to matter what grit of sand or carbide you use for etching. However, you need to use fine abrasive to keep from destroying the thin computer-cut mask. We use 240-grit silicon carbide and a small pressurized pot at between 40 and 60 psi.

There is no need to deeply etch the glass for glue chipping—a light frosting will do. Deeply etching the areas to be chipped may cause more inconsistent levels of glue. You can, however, do deep etching on the glass for decorative purposes, then remove the stencil in areas where you might want chipped glass and lightly frost those areas. As in the sample project, you can select areas to apply the glue.

Asphaltum is the “secret ingredient” in this process.

Now for the fun part. Mix up the glue and let it set for about 45 minutes (Figure 5). We use 5X glue available from stained glass suppliers. I bought 100 pounds of 5X glue a long time ago—enough for three dozen Letterheads meetings. A one-gallon jar of glue lasts years for most people. There are different types and grades of hide glue.

We use 4-oz. paper cups for the mixing—one cup of dry glue to one cup of tap water. Water weighs about twice as much as the glue, so you may hear the ratio of 1:2 tossed around as a formula.

After the glue soaks up the water, heat the glue in a microwave until it almost begins to boil. Pour it into small squirt bottles for application to the areas to be chipped. We also use the small squirt bottle with a needle tip that comes with the refill kit for our ink-jet printers.

When hot, the glue should be viscous enough to flow from the bottle. If not, add a little more water and reheat it. The bottle will be a bit hot, so use a paper towel to protect your fingers. As the glue begins to thicken in the bottle, remove the lid and reheat it for a few seconds in the microwave.

Now comes the rule of nature I spoke of earlier. Asphaltum is an oil-based product and the hide glue is water based. With the glass lying flat, carefully squirt the glue into the frosted areas that you want to chip (Figure 6). Be careful, but if a little of the glue laps onto the asphaltum, it will resist the glue and almost push it back where it belongs. Excess that remains on the asphaltum doesn't have much to grip, so it usually falls off harmlessly as the glue dries. (You can't pour a layer of glue over the entire piece—that's asking too much of the asphaltum.) If the glue happens to "bridge" over an asphaltum area, remove the glue before it dries.

With a little practice, this goes fast. The idea is to get a mounded layer of glue over the etched areas. Once you've done a couple, you can gauge the thickness by eye, but usually the glue is about $\frac{1}{8}$ in. thick.

The glue sets up fairly fast, especially on cold glass, so it's best to work in a warm part of the shop. Once covered with glue, set the piece out of the way in a warm area (Figure 7). Within 8 to 12 hours, the glue will dry and become almost transparent (Figure 8). It will begin to shrink, and you'll start to hear little "plinks" as the glue chips off the glass (Figure 9). The glue that chips off will be mixed with razor-sharp slivers of glass, so keep children and pets away. (Pets might try to eat the glue.)

In most cases, the glass will be chipped within eight hours (Figure 10). Any remaining, very small pieces of glue can be coaxed off with a stencil knife. Warmth speeds the chipping process. On small projects, we have set the glass on the stove top and turned on the oven at a low temperature. I've heard of people putting the glass in the oven, but I'd be reluctant to try that.

Now the asphaltum that covers the smooth areas of the glass is removed with a mineral spirits wash. Pour about 1 in. of mineral spirits into a small tray that you can stand the glass in (Figure 11). I use a cheap plastic tray used for wallpaper hanging. Wearing rubber gloves, hold the glass with one hand and flood the thinner over it with a small camel-hair brush (Figure 12). Work along the surface until most of the asphaltum has been rinsed into the tray. The mineral spirits can be saved and reused numerous times.

The asphaltum residue can be removed from the glass with a paper towel. Clean the surface with Bon Ami, and you're ready for gilding, lettering or other decoration.

An easier approach There are several advantages to this method. Fine detail is much easier to obtain with the asphaltum method. Computer mask is easier to cut, weed and apply than the sandblast mask—and it's cheaper, too. You don't have to check the glue frequently until it's partially dry, then hand cut along the chipped areas and remove the stencil. When pulling the stencil, it's easy to remove or lift areas you don't want to come up. Since you only apply glue into the sandblasted areas, you use a lot less glue.

You only pour the glue into the areas you want to chip, so you can also etch areas that you don't plan to chip. If a drop falls into an etched area, wipe it up and dilute that area with a damp cotton swab, and it won't chip. Because glue thickness is consistent from piece to piece, you can get a similar, even chipping pattern. With the other process, you must get the glue on the glass quickly and evenly, which is difficult on a large piece. Areas with a thick glue layer chip differently from those with a thin layer.

Using asphaltum you can also double chip the entire design, or parts of it, because the asphaltum stays on the glass until chipping is complete. Use a small brush to paint in missing asphaltum if necessary. It brushes nicely when thinned with mineral spirits.

Tips and shortcuts We have great success chipping in the high altitudes of Wyoming because the air is so dry—often between 7- to 25-percent humidity. We usually get nice chips in one day. In more humid areas, you may want to plan your chipping for dry, sunny days. Rick Glawson built a chipping cabinet that uses six heat lamps for warmth and a small fan to circulate the warm air inside the box. A clear glass panel on the front allowed him to watch the progress without opening the cabinet. He got good results in a day or two—even living only a few miles from the ocean.

On a dry sunny day, try taking your glass into the sun. Make sure the glue is dry first or the glue's surface will dry faster, and it may start lifting before the underlying glue is dry. We painted a 4-by-4-ft. piece of plywood black and placed it on sawhorses in the sun. The glass is held above this natural heater by a few stick spacers in the corners. Don't place the glass on a car hood—small pieces of glue may stay on the hood and dissolve again with the morning dew. The hood on my pickup has nice glue-chipped paint in several places. Do



The completed sign

not heat one area of glass with a heat lamp or heat gun—it will crack. Heat the entire area around the glass.

It may be easier to chip glass in the summer than winter. During the winter, if the glue is chipping nicely in the warm shop, we sometimes take the piece outdoors (often near or below 0 degrees F) for about 10 minutes. Usually the glass will chip very quickly—almost like popcorn jumping out of the pot. While we have had good results with this process, it only seems to work once or twice before the glue gets leathery and never seems to get fully dry again.

With either process, you may get stubborn areas that don't chip. This is usually the result of very thick or thin layers of glue. On the thin spots, you can usually apply some more glue. It bonds to the previous layer well enough. Generally, the really thick ones will chip eventually, but you can't always wait. These require a judgment call. One option is to wait until everything else has chipped, soak the glass in water and remove the excess glue. Paint a little asphaltum around the area, let dry, then carefully pour a bit more glue and wait for the process to finish.

Or, you can build a "tent" or solarium by placing a piece of glass over the area that won't chip, using some ½-in. blocks of wood to raise it off the surface. Spread a handful of silica gel granules on the chipped glass, then seal edges of the scrap of glass to the chipped piece with duct tape, creating an air chamber. The silica gel draws moisture from the air,

which helps the glue to dry faster. The silica gel will do its job within a day, though the chipping may have a slightly different pattern than the rest. Experimentation is in order with this process. You can buy silica gel, or desiccant, from a chemical supply house or florist supply. It can be reused by drying it under a heat lamp.

Most sign makers are content with any chip, while commercial chippers strive for consistent fern patterns. Too much glue will result in a glacier chip, which looks like the piece starts in one corner and lifts sections of glass as it rolls off the other corner. Over the years, most of our chipping hits somewhere in between. The new process usually results in "near fern" quality.

We have used a microwave oven to heat the glue for the past 10 years or so, however, you can use a double boiler or a commercially made glue pot. The commercial glue pots come in a variety of sizes. The one we had was a bit small for large panels of glass. Don't attempt to heat the glue in a pot on the stove.

Sometimes we accidentally mix more glue than we need. We mix the glue in a Tupperware® plastic measuring cup. The unused portion of the glue will harden over a couple of days, but to reuse the glue, you just need to add more water, let it set a while and reheat.

Using the old process, the thicker layer of glue often caused little "plinks" into the clear areas. To resolve this we did some experimenting with adding glycerin to the glue. We found that 15 drops of glycerin per square foot of glue mixture eliminated this problem. The formula goes like this: mix 1.5 ounces of dry glue per square foot of glass, then add twice as much water in ounces. So on a 3-sq.-ft. panel, mix 4.5 ounces of glue and 9 ounces of water (by weight), and then add 45 drops of glycerin. This is our formula for the glue we have on hand, based on normal thickness glue coverage, and allowing for the atmospheric conditions of our area. I hesitate to include this, but the information might be valuable to you if you are still using the old process and getting those annoying plinks. We never had the problem of glue being too weak, but I've heard you could add alum to the mix to make it more aggressive—though you would have to experiment to get the right formula. Glycerin is available at any drug store, but I'm not sure about alum.

On most glue-chipped projects, the designer allows a little "glow line" of about ¼ in. between any area they plan on painting and

the chipped areas. This allows the artist a little room for error when hand lettering. With today's computers, this 1/8 in. may be all that is needed to apply a reverse mask and fill in the centers. There is plenty of room for creativity in this process.

As with any new process, I strongly suggest that you do several test projects before you attempt to sell it. In my case, the first test pieces were done under the best of conditions. Our first real order involved four large pieces to be used as room dividers in a new restaurant that was opening soon. By the time the project came through, it was deep winter. It was fairly humid, thanks to a storm just passing through. I missed the ideal peel time on the stencil and had to really work to cut through the hardened glue. Of course, the designs were intricate Victorian scroll and leaf patterns, so cutting took a long time.

One piece chipped fairly well. Two struggled to chip, and the last piece wouldn't chip in several large areas. I hung a heat lamp about 12 in. above the surface, and things started chipping a bit. Then I heard a loud snap. The 30-by-72-in. piece of glass cracked right down the middle. The restaurant owner had already called half a dozen times and now I had to start over on one piece. With the bad weather conditions, I had a rough time doing it over. I would have no problem selling that project now and would get it out the door with more profit than those first ones, but that's the learning process. Hopefully, I have saved you some of the heartburn.

Things have changed a lot since my first exposure to glue chipping in 1982. The most notable, of course, is the development of the graphics computer and plotter—Gerber's SignMaker III® wasn't even on the market yet. The use of asphaltum as a resist is another improvement.

Both processes work. After you've tried both, you can choose the best for the project at hand. If the chipped areas are small or detailed, I would definitely use the asphaltum process. Thanks again to Rick Glawson for his reintroduction of the process! •§§



Mike and Darla Jackson operate Golden Era Studios in Jackson, Wyoming, and do a variety of sign-related projects. His Web site is www.goldenstudios.com. His E-mail address is golden@goldenstudios.com.

You can find sources for glue-chip materials on www.goldenstudios.com/esoteric.htm

Reference material:

I believe these books are out of print, but you may be able to locate them.

■ *How to Glue-Chip Glass*, 1978. New Renaissance Glass Works, 5151 Broadway, Oakland, CA 94611.

■ *The Art of Glue-Chipped Glass Signs*. Bob Mitchell, 1984, 1989. SignCraft Publishing Company, PO Box 60031, Fort Myers, FL 33906.

■ *Sandblasting, Etching and Other Glass Treatments*, 1980. Terri L. Gick, Gick Publishing, Inc.

Check out these Internet sites:

■ <http://www.humboldt1.com/~steve/gluechip.html>

■ <http://granite.sentex.net/~signman/WWWBoard/messages/790.html>

■ There have been several postings throughout the years on the Letterheads Bulletin Board [www.letterville.com]

■ Try a Web search for glue-chipped glass—you'll see a variety of links to sources, information and suppliers

It goes faster than you think

At first I thought glue chipping was tedious and perhaps more of a pain than it is worth. I was wrong. Once you understand the process and have all the supplies ready, it goes quickly. Here's an idea of the time spent on this small project:

1. Computer design:	10 minutes
2. Cut stencil on computer:	3 minutes
3. Weed stencil:	3 minutes
4. Clean glass and apply asphaltum:	5 minutes
5. Apply stencil to glass:	3 minutes
6. Etch glass:	2 minutes
7. Remove stencil from glass:	2 minutes
8. Mix glue:	2 minutes
9. Heat glue and pour into squeeze bottles:	5 minutes
10. Apply glue to glass:	5 minutes
11. Chipping time:	Not a factor unless you watch!
12. Clean off excess asphaltum:	10 minutes
13. Final glass cleaning:	5 minutes

Of course, these are the actual times to perform the steps, but it also takes time to set up for each step, clean up and so on. A larger piece would add a few minutes here and there to some steps. Using your time wisely, you can be preparing your glass while the computer cuts the stencil, so some of these times will overlap.