

# PAINTING FOR STAINED GLASS

## *Part Two*

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[Editor's Note: The following information is condensed from the Painting chapter of the SGAA Reference & Technical Manual, Second Edition. Part I of this series appeared in the Fall 2013 issue of *The Stained Glass Quarterly*.]

### **Special Tracing and Matting Techniques**

*Tracing over Undermatt:* One method employed to eliminate the necessity for a tack-fire of the tracing before matting is to apply the matt over the clear glass prior to tracing. Prepare matting color in a proportion of approximately one part gum arabic to forty parts color, depending upon the hardness or softness of matt that is desired.

When the matt has been thoroughly mixed, apply it to the glass in a light-transparent to translucent density, and allow to dry before proceeding with tracing. When tracing over an undermatt, add a bit more gum arabic to the tracing color; a proportion of approximately one part gum to twenty-five parts color will yield the desired results. The reason for this is a tendency for tracing color, when applied over a matt, to leave a slight liquid halation around the trace line which, when dry, resists removal in the painting process and irregularly enlarges the width of the trace line.

Run samples of the trace over the matt, allow to dry and lightly rub with your finger tip to see if the halation is resistant to the touch. If it is, add a little more gum, mixed separately from the body of the color before integrating with tracing color. Also run tests of the tracing color on clear glass, and, when dry, lightly draw a wooden stylus through the trace.

Do not make the tracing color so hard that it chips. Should halation still exist over the matt when the tracing color is dry, the matt may be too soft, so add a small amount of gum arabic. Success is a subtle balance between the gum in the trace and in the matt. The gum in the tracing color is the more critical element.

Once the correct proportions are resolved, you then align the matted pieces with the cartoon over the light table and proceed with the tracing. You will find that the matt will absorb the trace more readily than when tracing over unmatted glass. As a consequence, you will need to reload the tracing brush more often.

It is essential when tracing over an undermatt that the matt not be applied too heavily, as the tracing color is prone to drag over heavy applications of matt which rapidly absorb the tracing color from the brush. Too heavy an application of the matt will also obscure much of the cartoon.

Obviously, since it is difficult, if not impossible, to touch up any straying trace lines, one will want to feel very confident about tracing before attempting this procedure.

*Tracing with Oil:* Many glass painters prefer working with an oil-based tracing. Tracing paints can be mixed with turpentine and Venice turpentine (or—as preferred by some—with Damar varnish, turpentine, and clove oil).

When oil-based trace lines are allowed to dry, a water-based matt can then be applied without disturbing the lines. However, there is a tendency for the oil trace to repel the water matt along the edge of the tracing. This gives a halo effect which may or may not be to your liking.

Of course, one major benefit of this technique is avoiding a firing. However, it is more difficult to clean the brushes, and you should have a separate set of brushes for oil tracing. You will not be able to make any halftones with this method, but it will give you consistent opaque lines. Some situations or designs may well lend themselves to this method, so it could be worth your while to try it.

*Tracing Fine Detail:* Tracing of very fine detail can be done using a crow-quill pen as a tool and clove oil as the paint medium. The pen is a small (5") pen holder with removable steel points that come in several sizes. They are all rather fine. Some are flexible enough to make a variable line that has a lot of character. Others are harder and hold a line of a consistent width. Cross-hatching can be an effective method of shading with this technique.

Mix the clove oil and paint with a palette knife on a ground-glass palette. Most of the glass paints will work, and the clove oil—unlike most oils—will hold a line when applied to the glass. At this stage, the mixture should be smooth but not too thin, so that it will be easy to put into a small glass jar. After it is in the jar, add more clove oil to give it the consistency of ink. If the jar is tightly capped, it will last a long time and can be reused after stirring.

To trace thin lines, dip the pen into the paint, carefully wiping off the excess on the edge of the glass jar, and draw the lines on your piece of glass. You will need a low bridge to support your hand above the glass. This keeps the glass clean and protects your work as you progress. Stir the mixture frequently with a small stick. Wipe the pen tip occasionally with a tissue, as the paint tends to build up on the tip after a while.

Be very careful when repairing any errors, since the oil will smear. If you do make a wrong line or perhaps accidentally drop a blob of paint from the pen, blot the area carefully once or

twice with a cotton-swab. If it is an area that will be difficult to clean completely, let it dry, and then clean off any errors with a stiff brush, stylus, or sharpened wooden stick. Fire according to the temperature range of the particular paint you are using.

*Alcohol Matt:* Isopropyl alcohol, 98%, as a vehicle to which the water undermatt is resistant, can be used very successfully. Denatured and solvent alcohol can also be used, but, since they are not as pure as isopropyl, there is a greater tendency for them to adhere to the water undermatt. Alcohol matt can be prepared with any of the matting or tracing colors to a fine consistency. Bistre brown works quite effectively with an umber brown undermatt.

Alcohol matt is prepared in one of two ways. If you have a ball mill, it can be very thoroughly mixed to a creamy consistency in a short period of time. Lacking a ball mill, you simply pour some color into a suitable container and add alcohol to produce the consistency desired—more alcohol for a light density matt and less for heavier densities. It is then mixed in the container with a matting brush used exclusively for alcohol matt. Mix the color in the container completely so that the granules of color are dissipated and integrated with the alcohol. The consistency will likely never be as creamy as with a ball mill, but, with a little effort, it will be quite satisfactory.

(Note: Matting brushes composed of Camel (squirrel) hair should be assigned and remain with a specific vehicle, be it water or alcohol. A matt brush used in water tends to become stiff yet readily softens in water—not so in alcohol. An alcohol matting brush becomes soft and fluffy from alcohol and should be confined to that vehicle.)

Remember that alcohol evaporates quickly and your container should be one which is easily sealed.

The alcohol matt is usually added after the glass has been waxed up on an easel and after the undermatting and tracing have been completed. Try to lay the matt on as evenly as possible with the matt brush, as alcohol does not permit you the freedom of extensive blending. Usually it is applied quite densely so as to all but obliterate evidence of the tracing beneath.

Application should be done carefully since—for best results of even distribution—alcohol matt is applied in a rather liquid consistency, and there is a tendency for the matt to run to the glass beneath and sometimes lodge behind the glass; this may cause dark areas which can be quite disconcerting when you create highlights in the painting process.

After matting has dried, you then proceed to lightly stipple the matt to an extent which will reveal the tracing beneath. Since there is no binder in alcohol matt, it comes off very easily and responds to the lightest touch. For that reason, it is necessary that you work with a series of soft brushes—square sables and deer-foot stipplers, which come in various sizes.

The basic procedure for working the alcohol matt over a water matt is the removal of the alcohol matt from the water matt, leaving only the darkest shadows in the untouched alcohol matt. After removal of these areas, you then proceed with the deer-foot stipplers and stipple the defined edges of the alcohol matt created by the removal of the broad lights.

You then have glass that is totally covered by the water matt and partially covered by the alcohol matt in those areas of the darker shadows. From this point, you can then proceed with a small bristle brush to remove the major highlights in the undermatt. Then, with a longer (and consequently softer) bristled brush, you create the transition from the highlight to the midtone, which is the untouched undermatt.

The final result of this procedure produces five basic values—One: the highlight of clear glass; Two: the transition from the highlight through graduated removal of the matt to; Three: the untouched water matt; Four: the stippled alcohol matt producing transitions from the untouched undermatt to the; Five: untouched alcohol matt of the darker shadows.

*Shellac Matt:* Another matt which works quite well for application over an unfired water tracing utilizes shellac. The shellac can be either white or orange. The shellac is used as a binder in an isopropyl alcohol, 98%, vehicle and prepared in the same manner as with the alcohol matt.

The proportion of alcohol to shellac to begin with is eight to one. Should you want a matt softer to the touch, increase the alcohol; more resistance can be achieved by reducing the portion of alcohol. You mix the alcohol and shellac together before introducing it to the dry color. (Remember to re-test your color before using it in later painting sessions, since some of the alcohol will have evaporated, yielding a greater concentration of shellac and consequently a more resistant matt. It is recommended that alcohol be added first to any evaporated mixture in the paint. After mixing, test to determine if some shellac is needed to match the consistency of the preceding time. Should shellac be required, add it gradually and sparingly, testing it after each addition until the desired consistency is achieved.)

When applying shellac matt, you will find its character in application to be similar to alcohol in that it dries very quickly and is difficult to effectively blend even when applied very wet. The shellac does, however, somewhat retard the drying process; again, it is not sufficient to permit adequate blending, but it is sufficient to enable its distribution by stippling the applied matt with a blender. This stippling produces a velvet-like texture with a very soft quality, which is retained when removed with a soft black bristle brush.

*Turpentine Matt:* A turpentine matt offers an additional method for increasing the depth of the shadows. The vehicle

## The History of Painting

*Continued from Fall 2013*

Another material, similar to a stain, but a flesh tone, was sanguine—or more commonly called “Jean Cousin” after the painter of the period (1540) responsible for its development. Unfortunately, this flesh color is no longer available, as the process was lost with the painter, but it is referred to with great awe by those who have seen it.

By the fifteenth century, glass painting took on a more naturalistic style, as was the case in all the arts. Lines on elements such as drapery were more flowing, and figures were far less frontal, more humanized and visually three-dimensional. The use of actual portraits (usually of donors) which began about the fourteenth century, became even more frequent. Perspective—then a new aspect of art—was used in many ways, particularly with the introduction of background scenes and more elaborate archways. In general, glass painting gradually began to more resemble easel painting than the earlier gothic mosaic styles.

Flemish glass painters of the fifteenth century, following the artistic style of the VanEyck brothers, who excelled as easel painters, were in great demand in many parts of Europe and England. Their use of a combination of richly painted forms and strong glass colors was dramatic and became very popular. Kings College, in Cambridge, England, contains many fine examples of their work.

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used is turpentine, and the binder and flowing agent is Venetian turpentine, which are mixed with any of the colors used for matting.

To two tablespoons of color, add turpentine, and mix in the same manner as with preparing color with water. When mixed thoroughly, add  $\frac{1}{6}$ th of a teaspoon of Venetian ‘turps’ (a glob of about  $\frac{1}{4}$ " diameter) and mix to a creamy, flowing consistency.

The painting that has been completed, especially if it has incorporated alcohol matt, should be fixed before proceeding with the application of oil. An excellent fixative can be prepared with one part shellac to nine parts of isopropyl alcohol. This is sprayed over the painted portions in a fine mist sufficient to hold the paint. When this has dried, kerosene is applied to the painted surface. This provides a float bed upon which the oil shading can be maneuvered without leaving an edge from the application. There should not be a flowing excess of kerosene, or the paint will start to run—just sufficient to permit the manipulation of the paint. Should too much kerosene be applied, either wait until some has evaporated or lightly blend it with a blender to pick up the excess.

Oil color is applied with sable brushes of square-flat and round-pointed shapes. It is then maneuvered with a blender to its desired positioning and blended transitions. On small work, a normal-sized blender may be found cumbersome and it is advisable to have some soft brushes to use in these instances. Square sables and Camel brushes, like makeup brushes, work well.

After the color is applied and blended, it should remain in its placement and not run if the kerosene is not too wet. If the application of kerosene is too dry, there will be a dragging reaction to the blending. It is essential for the best results that the kerosene be of the right consistency of dampness.

To remove oil color which may have blended into an area in which it is not desired, take a clean sable, dip it in clean kerosene, and carefully remove the excess.

Oil color produces beautiful and luminous shadows with a quality not obtainable with water or alcohol.

### ***Inscriptions***

*Positive lettering:* This is a direct tracing process. With a cartoon placed under the glass, you can trace the lines of the letters. You will want to strive for accuracy to avoid too much clean-up, but the lettering can be touched up and refined with a pointed stick. Any style of lettering that is appropriate to the design of the window can be used. However, avoid fine lines which will be lost if the work is to be seen from any distance. You will probably want to add at least a light matting to hold the letters and make them more readable.

*Negative lettering:* In this style of lettering, the letters are created by removing paint from a painted matt. The area to be covered with negative lettering should be blended with an opaque layer of trace or matting paints that have been mixed with a medium amount of gum.

The design or lettering to be highlighted through the matting should be drawn onto tracing paper. Using a glass easel or a light box, place the pattern carefully over the matted glass. Hold it tight, or tape it down securely. It must not move, or your design will be distorted. With a stylus or ball-point pen, gently trace the lines. Check carefully under the paper occasionally to be sure all lines have been traced.

If the paper is too thick, or the matt too hard or heavy, you may need to first chalk the reverse side of the tracing paper where the design is located. Then, when you trace the design, the chalk lines will appear.

Remove the paper, and, with a needle, sharp stick, or brush, highlight the letters as desired. Fire to 1200°F–1250°F.

If desired, you may want go over the lettering with a light matt for shading, and re-fire. In many cases—as with the positive lettering—this will probably be necessary to control halation. If the finished glass is to be read from a considerable distance, the halation effect could distort or even obliterate most of the lettering.

Perhaps one of the most annoying situations studios encounter is a memorial inscription with an error in it. Fortunately, there are methods to correct these mistakes in lettering without redoing the entire inscription.

If a word such as “Peter” is incorrectly spelled “Petar,” and the error is spotted in the studio after firing has taken place, use a fine grinding stone in a Dremel drill to carefully grind away the offending letter and surrounding area  $\frac{1}{8}$ " around the letter. The surface of the glass will be somewhat rough. However, after cleaning the area with rubbing alcohol and re-firing at normal firing temperatures, this will fire-polish the now blank area enough to re-matt and pick (scratch) out the letter “e.” Re-firing will completely fire polish the area beneath the new letter.

### ***Sodium Silicate***

Sodium silicate, popularly known as water glass, is a thick, transparent, and odorless liquid. For painting on glass, sodium silicate is added only to water, never directly to the paint.

*Tracing:* After mixing the tracing color using the regular mixing techniques, prepare another palette. Since you will not be putting very much color at a time on this palette, it need not be any larger than 6"x 6", nor sandblasted. Place approximately a teaspoonful of mixed color on this palette, as you do not want so large an amount as to not be used before it hardens from the silicate and cannot be appropriately rejuvenated.

The sodium silicate used is 42%, and it is mixed in a ratio of one part sodium silicate to seven parts water. (This proportion can sometimes go as high as one to eight.) It should be stirred, as the silicate has a tendency to settle to the bottom. It is advisable to use as little silicate as will maintain resistance to the subsequent application of water matt. When too much silicate is used, there is a tendency for it to fire with a raw, dull finish, fry up, or have small pinholes throughout the trace line.

You then dip the tracing brush in the prepared vehicle and mix it with a small portion of the color placed on the second palette. It is essential that the vehicle be well integrated with the color and within the brush before proceeding with tracing. You will find that sodium silicate color dries faster than either water or vinegar trace and lacks some of the flowing property as a result.

It is advisable to have a set of tracing brushes to use exclusively with sodium silicate and they be kept as clean as possible. Do not let the color harden on them, thus ruining them. This is particularly important at the point where the hair enters the ferrule.

*Matting:* Though unconventional, it is possible to use sodium silicate as a matt. Its hardness prevents its use with the traditional methods of applying matt and removing

In the sixteenth century, transparent enamels were formulated for use on glass. This development provided glass painters with a wider palette of paint colors. Although much lighter in tone than pot glass colors, using them in conjunction with stains, tracing, and matting gave the glass painter a broader range of possibilities with larger and fewer pieces of glass.

Unlike silver stains or Jean Cousin, which permeate the glass, or glass stainers' paints that are fired to a higher temperature, enamels form a layer on top of the glass that can be adversely affected by airborne chemicals. Many of these painted windows have not weathered well, and it has been necessary for them to be repainted periodically.

All of these developments, combined with the use of flashed glass that could be abraded to change colors within one piece of glass, provided greater flexibility in glass design.

Flashed glass was an introduction that advanced the use of enamels and stains. Until about 1813, the flashed layer was removed from the base glass by scraping or by abrasion; after that time, hydrofluoric acid was used to etch glass. Extremely complex designs were possible with the use of all or some of these techniques within a rather limited space. Heraldic glass panels made use of a combination of flashed glass, stains, and enamels and contain both tracing and matting. Most of these heraldic

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devices were produced in Switzerland, where they were a popular secular design concept, particularly during the Reformation.

Toward the end of the fifteenth century, stained glass—up to that time almost exclusively a church art—began to be used extensively in secular buildings. Roundels were a particularly popular painted device. Often designed by printmakers, they were very detailed and precise, and were painted on a single piece of clear or lightly tinted glass.

By the seventeenth century, the emphasis was on painting instead of cutting colored glass pieces. Glass painters were using easel-painting techniques on larger areas and painting glass windows as though on canvas.

Glass painting has always been influenced by other painting mediums of the time, but never more so than in the seventeenth century. In England, well-known artists such as Joshua Reynolds created the designs for several windows. The glass had only to be cut into a few large shapes or rectangles before being painted and then leaded into a window.

This idea was scorned by many and has often been considered the decline of stained glass. One group of windows at New College Chapel in Oxford, England, that became a *cause célèbre* was designed by Reynolds. These windows were considered the “best...of the worst,” by Charles Connick.

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highlights. However, cases in which a strong shadow is desired lend themselves to sodium silicate matting.

First, dilute sodium silicate tracing color to a matt-like translucency. Using a series of square sables, lay in very light and delicate shadows. Since waterglass dries very quickly, it permits minimum opportunity for blending in much of a transition of value. As a result, the effect of blended transitions can be better accomplished by applying a series of very light matts successively in a build-up of overlays.

The deepest shadows can have more than four overlay applications. The lightest matted areas, of course, will be those with only one layer of sodium silicate matting.

When a light water matt is applied, you will find that the piece is closer to completion than you might have anticipated. The water matt serves as a unifying glaze or bridge from the clear glass to the shaded. All that is needed are a few strategically placed highlights, and the piece will take on an immediate and unexpected degree of dimensionality.

“I found this technique to be particularly effective for a job I did,” said artist Richard Millard, “for which I had to paint eighteen large figure windows. The approach with which I worked was not one of subtle blended transitions of matt but rather bold, flat, hard-edge applications which varied from an almost dense opacity to pale transparency which produced a most glassy character. This was a style most compatible with the design of the windows, which consisted of the painted figures against a background of unpainted antique glass with a narrow interior border separated from the perimeter border by a field of antique glass.”

Against this background of unpainted antique, it was essential that the painted portions not be over-painted and to leave abundant areas of clear glass to integrate with the background. Sodium silicate matting applied in overlays of a prismatic character effectively served this need.

### ***Silver Stains***

Silver stain is a product that has intrigued all those who are familiar with its marvelous transparent golden quality. It is unlike glass stainers' paints or transparent enamels in that it penetrates the glass and becomes an integral and permanent part of the chemical structure of the glass, altering the refractive index. It is the basis for the name *stained glass*.

Silver stain was the first product that truly freed the glass painter from the use of lead lines as a means of separating glass colors. They make it possible to isolate areas of vivid yellow or golden color within one piece of clear glass.

The composition of the glass used for silver staining can have a marked effect on its reaction to the stain. In general, the best glass for staining would be clear glass of almost any type. The softer glasses such as antique, semi-antique and new antique will have a lower temperature requirement (1000°F) than the harder flints or window glass. The latter do very well at 1050°F and work well for initial projects.

Silver stain can also be effective on various kinds of lightly tinted glass, even to achieving a mix of colors on some. For example, silver stain on blue glass may produce a green area. However, this is not consistent from one color or one sheet of glass to the next. All glass should be tested first. This is a hard rule to follow, for it takes time. Be assured, it is a rule that will save both time and frustration.

Flashed glass stains best on the base glass side, although this is not a hard-and-fast rule, either. Each side can offer different effects, and it is worth testing to be aware of

the differences. Stain applied on both sides of flashed glass offers even more opportunities for interesting color changes.

If you are working with float glass, which is the majority of today's window glass, you may encounter some discrepancies in the staining power. Float glass is highly vulnerable to chemically produced effects such as staining. In the manufacturing process, the glass is floated on a bed of molten tin. This is done so that the surface of the glass is bright and shiny without the need of any additional polishing. The glass retains some of this tin. Depending on how much is present, this tin side will not stain well.

If you have any window glass that creates an inconsistent or stubborn staining situation, you can test it using a short-wave ultraviolet light. This is the same type used to determine the presence of phosphorescent minerals in rocks, and a local rock shop can help you obtain one. When you shine this light on the glass in a dark or semi-dark room, you will see an opaque milky glow on the tin side. You would then stain on the opposite side.

Another method to determine the float side is to mark side "A" and side "B," cut off a small square (3" x 3") and apply silver stain to side "A." If the results are acceptable, that side was not on the tin. Obviously, a poor result will identify the side that was on the tin.

Regardless of the type of glass used, before staining — or doing any glass painting, for that matter — the sharp edges of the glass should be removed to protect your brushes and your fingers. A carborundum stone run over the edges of the glass will take care of the problem. Those razor-sharp edges can ruin a brush with one stroke. The glass should then be cleaned thoroughly. Be sure to remove the residue many cleaners leave behind. Ethyl rubbing alcohol (Lavacol® brand) and acetone will both remove this residue.

To begin mixing, you will need a ground-glass palette made by lightly sand-blasting a ¼" thick piece of plate glass. This palette should be used exclusively for stains. One that is 10"x10" is usually sufficient. Silver stain is best used for highlighting, accenting, and dramatizing small-to-medium-size areas. After all, if it's a large area, a piece of yellow glass would possibly be more appropriate.

A stainless steel palette knife is necessary, since the stain will corrode any other metal. A plastic palette knife is even better, since the stain can be allowed to dry on this as well as on the palette. You will then not be washing your expensive material down the drain. If you keep these covered and clean, you need only to reconstitute the dried stain with water for later use.

If you do other glass painting, it is advisable to have separate blenders and brushes for silver stain. Materials in the stain are very corrosive to most painting tools. These should always be cleaned carefully soon after use. In spite of a good cleaning, it is important that these brushes not be used for other glass paints, as they can contaminate each other, no matter how clean they may seem.

If you stain only occasionally or are just beginning, it is not necessary to invest in an expensive badger blender for staining. The blending of stains does not require the finesse that is necessary when matting. You may want one eventually, and, when you do, the 2" size is usually adequate, depending on your individual requirements. In the meantime, an inexpensive hake, or smaller sumi brush will also do a fairly good job. This is a wide, flat bamboo-handled brush with white hairs and is found in most art supply stores. It is available in several widths, and, again, the 2" size is recommended. Cut the tapered tips off just a bit so they are very even.

Remember: Never use your good badger matting blender for staining. You will also need a few applicator brushes of various sizes. These can be any soft watercolor

This attitude is now being re-evaluated and the windows appreciated for the quality of the painting and their place in history. Some of the most painterly glass painting was done on these windows; however, it did change the concept of the traditional stained glass window.

It was the response to these painted windows that set the stage for the gothic revival in the nineteenth century. With a renewed interest in medieval windows, the return to the use of pot metal glass and intricate leading became more prevalent. However, the painted figures in these windows still assumed a realistic and three-dimensional presence not seen in the medieval period.

The gothic Revival became an infusion of lessons learned from both the mosaic-style gothic period and the painterly renaissance style. Windows were exported to the United States in great numbers, and many studios grew to meet the increased demand for this style. One major center was located in Munich, Germany, where Mayer Studio employed as many as 75 painters (out of a total of 550 employees). This studio produced several master painters, some of whom eventually left Munich to start their own studios, thus spreading this style of painting to many areas, including the United States.

Some studios native to the United States also set up studios in the Munich area to utilize the talents of their painters. During the height

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of glass painting in Munich, these master painters were accorded special treatment and held in high esteem. In a conversation with Gabriel Mayer, Mayer Studios, 1990, it was noted that the flesh painters (in particular) would arrive by carriage at an appointed hour each day, and all would notice and attend them their due respect.

In England late in the nineteenth century, a new trend known as the arts and crafts movement evolved. Glass artists in a one-person studio handled all of the various skills, including painting. Previous to that time, craftsmen were assigned to a particular trade or skill—a carry-over of the medieval guild system. Even painters were assigned different painting responsibilities with flesh painters being the most prestigious.

In the United States in the mid to late nineteenth century and early twentieth century, John LaFarge and Louis C. Tiffany used painting where necessary, but, when possible, preferred to make their own glass to achieve the desired effect. Much of the painting that was used on these windows was enamels and oil, rather than the more traditional glass stainers' paints.

Air brushing—often used for applying an over-all matt surface—is now used to paint very realistic and sophisticated statements. In addition, paints that mature at much higher temperatures and are used when fusing glass are a fairly recent introduction.

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or tracing brushes. Of course, they, too, should be used exclusively for silver-stain. Tape a piece of yellow plastic tape on all your silver staining tools for easy identification. Some stiff-bristle highlighting brushes, a small wooden stick, and cotton swabs will complete your tool requirements.

Now you are ready to mix your stain. On the ground-glass palette, place about one level tablespoon of stain. The composition of the stain is such that gum arabic is not needed. In fact, if you should add some, it would make it more difficult to remove the stain when outlining or highlighting. Therefore, just add water, and mix thoroughly with the palette knife.

The manufacture of stains is now refined to the point that it is rarely necessary to grind the mixture with a muller. It usually has a nice, soft, smooth feel to it very soon after mixing with the palette knife. Continue mixing until you are sure it is very smooth, adding small amounts of water as you go.

You will want to add more water as you saturate your brush with the stain. A mixture about the consistency of thin cream will get you started. Brush this onto the glass, laying on as much as desired. The thickness of the mixture when it is applied depends on the effect or intensity you wish to achieve. If the application is too thin or the mixture too watery, it will barely stain the glass, no matter what temperature is used in the firing. If it is too thick, it will be difficult to blend and highlight, and will probably cause metaling even at a low temperature. (Metaling is a condition that occurs from either over-firing or from too heavy an application of stain, which can leave a whitish opaque residue on the glass.)

You will need to practice and test several pieces to become familiar with the ideal consistency for the results towards which you are working. The stain can be brushed on without blending, but is better if it is blended at least a bit, unless you want the variation in color that the original brush strokes will create.

The blending can be handled in the same manner as when matting with glass stainers' paints. That is, it can be blended smoothly, which will result in a very even coloration after firing. Unlike matting, do not worry if a few surface brush strokes remain. They will rarely show in the finished piece. You can also blend by shading from dark to light, with very dramatic color changes. Stop blending before the stain is too dry. (It is best not to touch up with additional stain once the original application is dry. If the error is considerable, you are better off wiping it off and redoing that area.)

Any highlighting or clean-up is easier if the stain is still damp. But if it is too wet, disturbing it will negate the blending. In this case, let it dry a bit until just damp. If it is too dry, it will be difficult to remove. A damp, but not wet, cotton swab is a good clean-up tool. It is also helpful to use the warmth of your breath to soften the stain. Breathing on small areas at a time will make it more workable.

The same type of highlighting brushes and tools used for matting are also used for silver stain, although, again, it is recommended that you have a separate set for staining. When through highlighting, be sure you have cleaned off any stray spots of stain from the glass, as these will make a yellow mark in unwanted areas.

Usually, you will be applying stain to the glass on the reverse side of any tracing and matting. This need not always be the case, but silver stain should never be applied over another paint. Since it actually stains into the glass, any other paint on the surface would cause an interface. The chemical transfer could not take place, and you would end up with a mess since the iron-oxide carrier would fuse with the base paint.

If you are working with enamels, this rule also holds true. But you can obtain some excellent results by using transparent enamels over the stain, after the stain has been fired. Some of the ruby or carmine colors, for instance, painted over a stained area will produce a lovely peach color.

When firing silver stains, the kiln shelf should be prepared with a 1/8"-1/4" layer of clean whiting. The finer the powder, the better. Whiting is relatively inexpensive and available at most commercial paint stores. Sift the whiting on as evenly as possible. Holding the glass by the edges, carefully set your stained pieces on the whiting. If you gently press it a bit as you set it down, it will flatten out the whiting. Some of the new kiln washes developed for fusing glass are also excellent.

You may choose to fire your stain at the same time as the tracing and/or matting. If so, fire the stain side of the glass face down on the kiln shelf. The tracing side should be fired up. You will need to fire this to about 1250°F to correctly fuse the trace and matting paints. If you are using this method, do not put the stain on too heavily, or you could get some metaling due to the higher temperature. Also, when firing the stain face down, you definitely should use whiting even if using a kiln wash, since the whiting is easier to replace after each firing. This is necessary, since, during firing, the stain will leave a residue on the whiting that can be deposited on the next piece of glass.

If you prefer to fire your tracing and matting alone, then the silver stain can be fired face up in the second firing at 950°F–1050°F. It will depend on your kiln and the type of glass you are using. As mentioned earlier, as a rule, the softer glasses will take the stain faster. Float glass will probably require 1100°F.

Once the glass is put into the kiln, close the door or lid, turn the controls to high, and heat to about 950°F–1050°F. Turn it off, and, with the door closed, let it cool completely.

If firing to 1250°F, turn the kiln off, and vent the kiln until about 1000°F. Do not vent the kiln at lower temperatures, or you will be in the annealing range. Close the door or lid, and let it cool to room temperature.

If using oil-based mediums, you will need to vent the kiln initially to 600°F to burn off the oils and exhaust the fumes.

If your kiln does not have an automatic shutoff, a small timer is a wise investment to remind you when the kiln needs attention. It is easy to be distracted during firing times.

After firing is the fun part, although it is at this stage that many beginners feel they have failed. When the glass is cooled and removed from the kiln, it will look the same as when it went in. The iron oxides do not burn off. They must be washed off, either with a damp sponge or at the sink under running water. Rubbing with the sponge will remove any stubborn spots. Dry the glass, and hold it up to the light. If you've done your job well, it should be a beautiful transparent golden yellow or amber color.

Don't worry if you have a light amount of metaling on the surface. This will show only in reflected light, and, when minimal, is not objectionable. If there is enough metaling to reduce the transparency to a great extent, you will probably elect to redo the piece. Remember to use a thinner application of the stain or a lower kiln temperature. The glass has just not been able to absorb all of the silver that was available to it. If absolutely necessary, metaling can be removed with hydrofluoric acid, but protect the front side of the glass, so the acid does not damage it, and observe all safety precautions.

Although all of the traditional painting styles and methods are still the basics for a glass painter, new developments and techniques are being absorbed rapidly by many. Our glass painting heritage is an essential guide, but it also becomes important to be aware of new directions. It is an exciting time to be involved in glass painting!

## Tools and Equipment

### *Brushes*

The most important tools that you have are your brushes. They are the instruments by which you will be able to breath life into your paints and beauty into your painting. They are strong yet delicate; enduring, yet fragile. They allow you to trace a pencil-thin line or lay down and blend an even, gossamer shading over a large area. They are your silent servants, but they are very demanding. They demand that you clean them carefully, protect them from damage by the sharp edges of the glass, and store them properly. A fine brush is a joy to use and an absolute necessity if you are to do the best work of which you are capable.

Fine brushes are made by cupping. A small metal cup is made, the interior of which is exactly the shape of the finished brush. The brush maker takes a pinch of hair from the prepared bundle

*Continued*

and inserts it skillfully into the cup. The skill is in determining the exact amount of hair to take so that each brush is the same as every other brush of the same size and then artfully arranging it into the proper shape, whether pointed, square, deerfoot, etc. The little bundle of hair is then tied at the end before being removed from the cup. Finally, the bundle is inserted into a metal ferrule and a drop of cement added to make it secure. The finished handle is put into the ferrule and crimped in place.

The best blenders are made in a somewhat different manner. After the bundles of badger hairs are treated, formed, and tied, they are inserted into pre-drilled holes in a block of wood or hard rubber, which becomes the brush plate and will be fastened to the handle proper. In order to make the brush as strong as possible, the ends of the bundles go through the wooden or hard rubber plate and are then reversed and pushed up through an adjoining hole. This means that each bundle has a sort of hook shape through the brush plate. When all the bundles are inserted and the ends turned up again, thin wire is used to weave through the hooked ends of the bundles to make them as secure as possible and prevent them from pulling out.

*To be continued in  
a future edition of  
The Stained Glass Quarterly.*

It is important to mention that, since you are aiming at a high level of transparency, be attentive to retaining a good deal of this quality when matting on the front side with the glass stainers' paints. Use stronger highlights in these areas especially, or your staining efforts will be less effective.

*Other Techniques:* Once you have achieved a certain level of control with both the flexibility and dependability of staining, you are now ready to try to manipulate the colors.

You can try to intensify the color with an additional firing, but the success of this depends on many factors and may lead to more metaling. You can also apply more stain and re-fire, but, here again, metaling can be a problem unless careful control is exercised. Rather, I would recommend using a stronger stain, such as Amber Stain, for the initial application.

Sodium sulfate can also be used to intensify the color of the basic stain. For instance, if you use Yellow Stain #3 you can raise the color level to some degree of Orange Intense. This is within limits, depending on the glass used, the level of application of the stain, and the kiln temperature.

Sodium sulfate is sold in powder form and can be purchased at a chemical-supply house. Try to buy a small quantity, as you do not use much at a time. The amount you use will depend on the color change for which you are striving. However, if you use too much, the stain mixture will adhere very tightly to the glass, and it will be extremely difficult to highlight or clean up your lines.

If you begin with a teaspoon of silver stain powder on your palette and add a light sprinkling of the sodium sulfate powder (10% by weight), this should be enough to intensify the stain but not bind it too tightly to the glass. The sodium sulfate is gritty, so you will need to mull it a bit and then apply as usual.

Even more intense color changes are possible with copper sulfate. This is one of the chemicals used for antiquing solder when copper foiling. A 2-1 ratio of silver stain to copper sulfate will raise the color level considerably, but you may want to adjust this to your own requirements. Grind the copper sulfate granules on the ground-glass palette with a glass muller until fine. Add the silver stain to the ground copper sulfate, and then add the water. Continue mulling for a smooth mixture. This is best applied thinly and then blended, although interesting combinations of yellow and green can result if randomly applied and not blended.

These additives are mentioned as something to have fun with. They can save you a bit of money but also can be unpredictable. If you do a considerable amount of staining, you would want to have a wide enough selection of the stains on hand to meet your needs.



End of Part II

*"Painting for Stained Glass" will be continued in a future edition of The Stained Glass Quarterly.*