

# GLASS PATTERNS

— Q U A R T E R L Y —

Spring 2020

Volume 36 • No. 1



Volume 36 No. 1

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July 20, 2020

July 30, 2020

#### Winter 2020

Editorial

Ad Closing

Ad Materials

*Wildlife and Landscapes*

August 20, 2020

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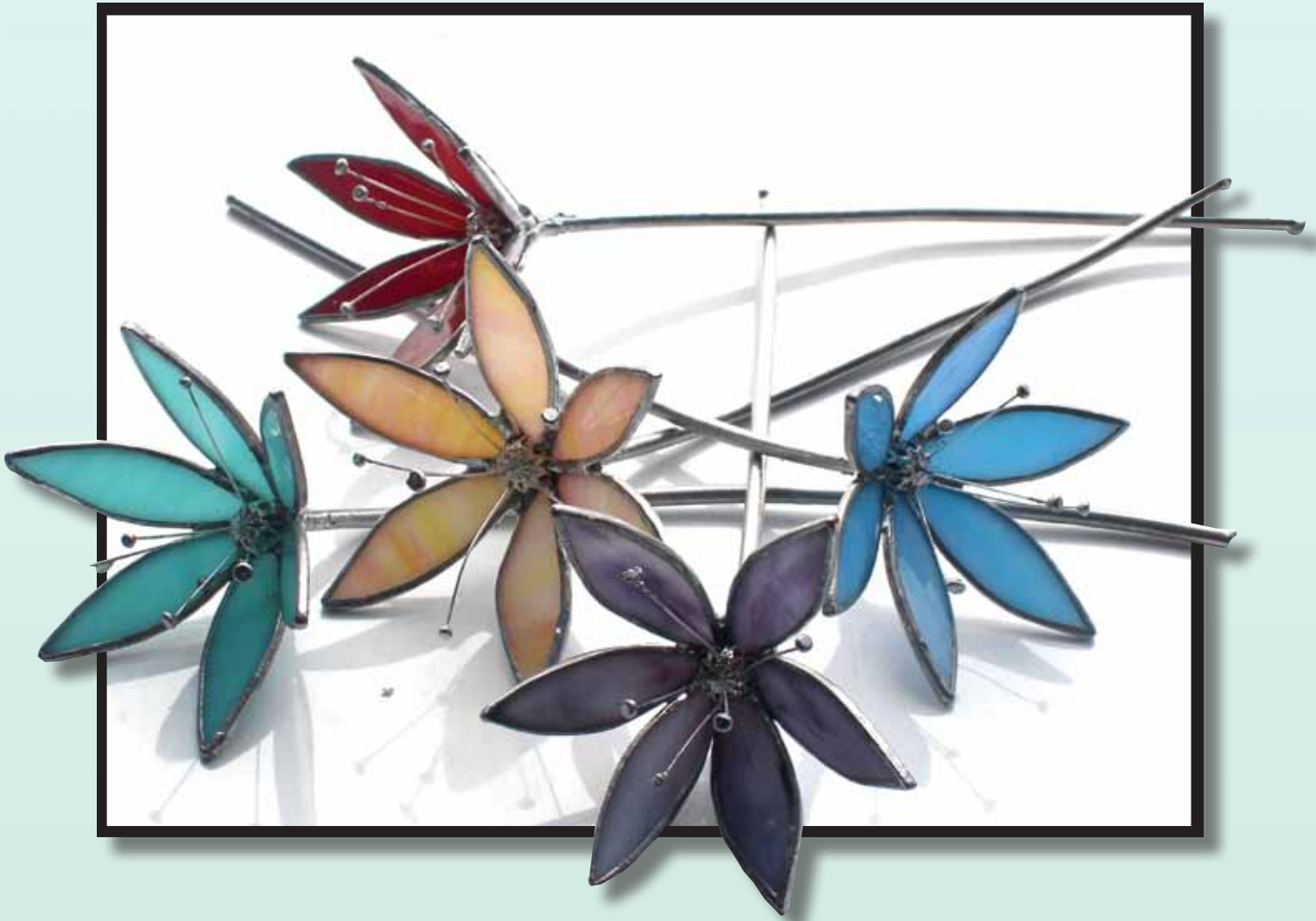


For more information, including tips and accessories, visit [HakkoStainedGlass.com](http://HakkoStainedGlass.com)

# Daylily Flower Stem

## An Introduction to Stained Glass

*Design, Fabrication, and Text by Lidia K. Anderson*



Display a bouquet of these free-form flowers in a vase or perhaps plant them in with your favorite potted greenery. Either way, these flowers will brighten up any space. Use a variety of complementary colors and make them pop!

### **Opalescent or Cathedral Glass**

Any Desired Colors, Scrap

### **Tools and Materials**

7/32" Copper Foil    Lead Free Solder

Temp-Controlled Soldering Iron

4- or 6-Gauge Solid Copper Wire or Copper Tube

Strong Wire Cutters or Tube Cutter

2" Jewelry Eye Pins    Flux

Glass Cutter    Polishing Compound



1  
*Cut out the pattern, size it to your preference, and use it to trace 6 petals onto the glass of your choice.*



You can use opalescent or cathedral.

2  
*Prepare the petals for assembly.*



Cut out the 6 pieces of glass, then grind, wash, and dry. Foil all of the pieces and burnish all the surfaces and edges. Flux and tin-solder all the foiled pieces.

3  
*Arrange each petal at a slight angle to the adjacent petal, flux, and tack-solder the bottom tips.*

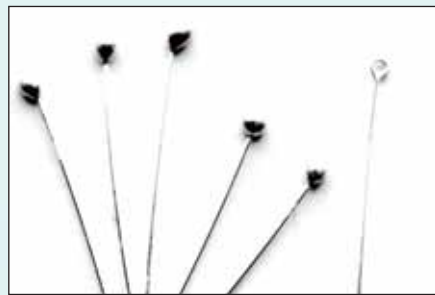


Tack-solder them just enough to hold them in place. Bring all of the flower petals together.

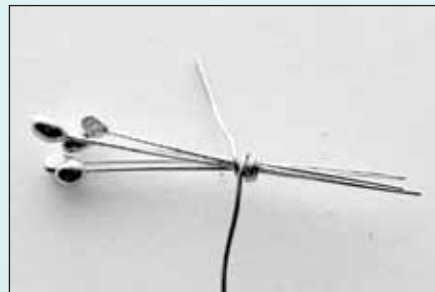
4  
*Turn down the soldering iron temperature about 40 percent and bead-solder all of the seams inside and out.*



5  
*Gather around 5 or 6 jewelry eye pins, flux the eye, and put a solder drop in place.*

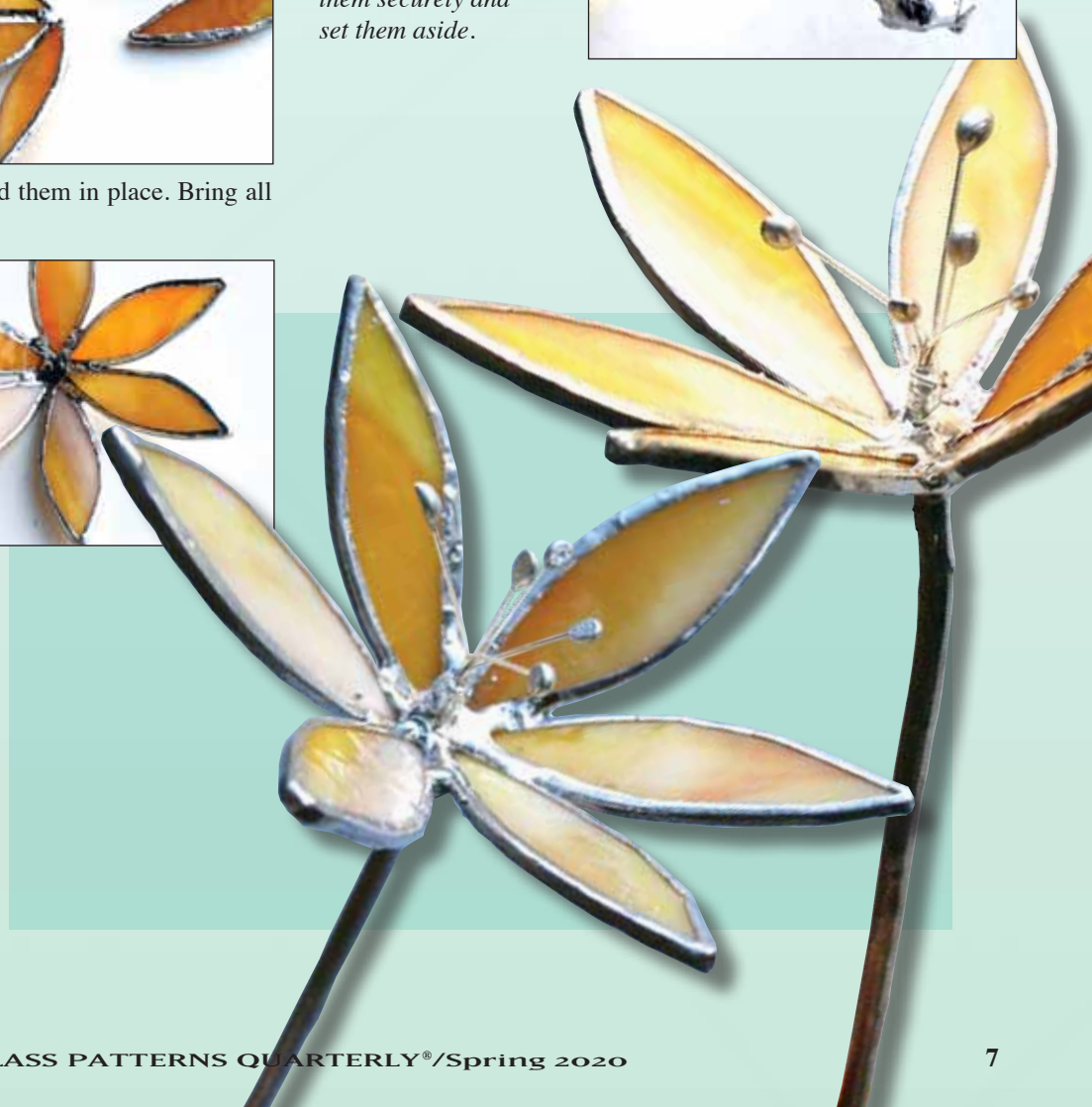


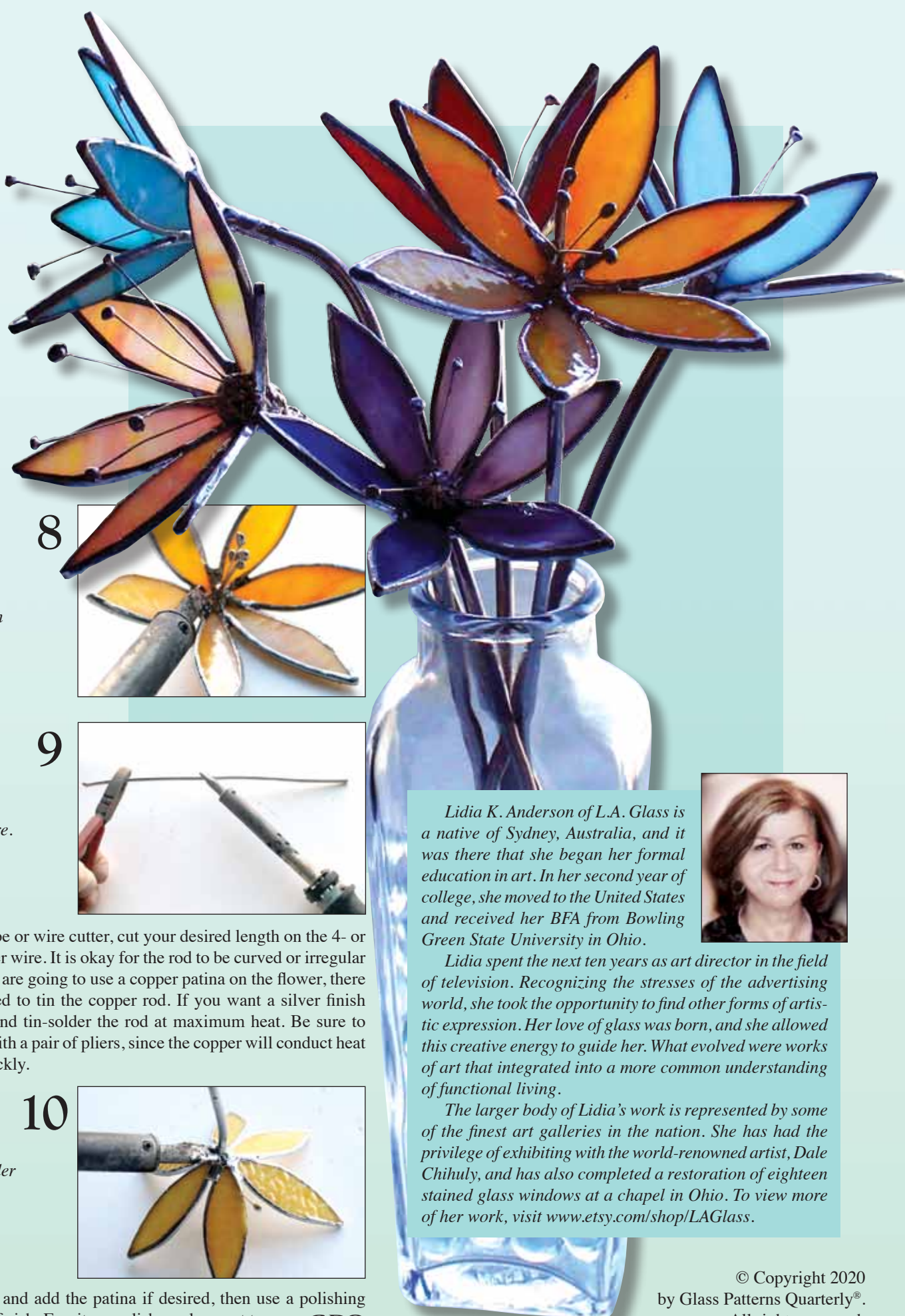
6  
*Arrange the eye pins at different levels like a bouquet and wrap the wire around them.*



These will become the flower stamens.

7  
*Tack-solder the seam, cut off the bottoms of the pins so they are flush, then solder them securely and set them aside.*





8

*Gather the stamens and solder them on the center of the flower*



9

*Tin-solder the copper wire.*



Using a tube or wire cutter, cut your desired length on the 4- or 6-gauge copper wire. It is okay for the rod to be curved or irregular shaped. If you are going to use a copper patina on the flower, there will be no need to tin the copper rod. If you want a silver finish instead, flux and tin-solder the rod at maximum heat. Be sure to hold the rod with a pair of pliers, since the copper will conduct heat extremely quickly.

10

*Turn the flower upside down and solder the end of the copper rod to the center of the petals.*



Wash, dry, and add the patina if desired, then use a polishing compound to finish. Furniture polish works great too. **GPQ**

*Lidia K. Anderson of L.A. Glass is a native of Sydney, Australia, and it was there that she began her formal education in art. In her second year of college, she moved to the United States and received her BFA from Bowling Green State University in Ohio.*



*Lidia spent the next ten years as art director in the field of television. Recognizing the stresses of the advertising world, she took the opportunity to find other forms of artistic expression. Her love of glass was born, and she allowed this creative energy to guide her. What evolved were works of art that integrated into a more common understanding of functional living.*

*The larger body of Lidia's work is represented by some of the finest art galleries in the nation. She has had the privilege of exhibiting with the world-renowned artist, Dale Chihuly, and has also completed a restoration of eighteen stained glass windows at a chapel in Ohio. To view more of her work, visit [www.etsy.com/shop/LAGlass](http://www.etsy.com/shop/LAGlass).*

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## SQUARE STANDS



## ROUND STANDS



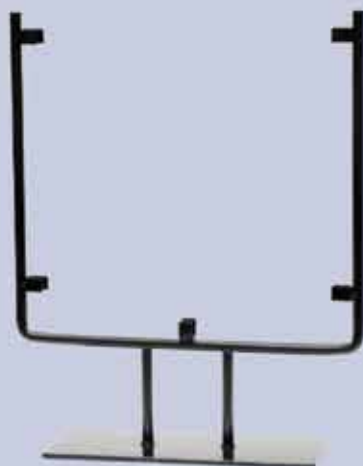
## ANGLED STANDS



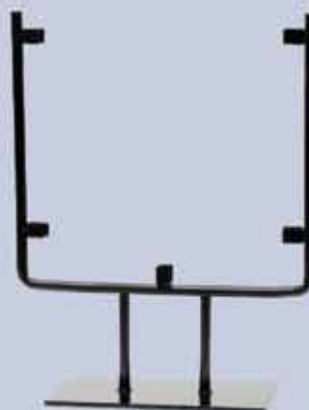
## POINT-DOWN STAND



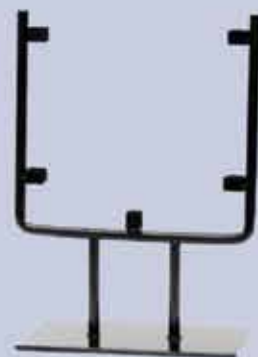
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Point-Down Stand



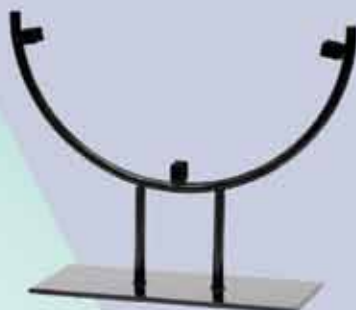
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**AAN-DSSS08**  
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# Tulip Trees

## Pink Magnolia Magnificence

*Design, Fabrication, and Text by Leslie Gibbs*

Photography by Jon Gibbs



**M**agnolia trees come in many varieties. Most common is the Southern Magnolia, the state flower of both Mississippi and Louisiana. With its large, glossy leaves and huge, fragrant white blossoms, you know you are in the South when their sweet fragrance fills the air. One bloom alone will envelop a room with its delicious citrus-like aroma.

My favorite magnolia, however, is the magnificent flowering pink magnolia. This blushing variety is also known as the tulip tree, with its cup-and-saucer shaped blossoms—pink and rosy on the outside. But a peek inside the blossom reveals its soft white center.

I listed the glasses that I have used for the petals in the glass list, but you can also choose to use another selection of pink glasses or blend iridescent, opalescent, and streaky to give dimension to the blossoms and keep them from appearing flat.

Besides solid colors of pink glass, I also used several pink/white streaky glasses to add interest to some of the petals. There are some nice wispy and streaky blends that will match up nicely with the basic solid pinks.

A staple of spring, this magnolia lights its pink fires to banish the grays of winter. So even if you live in the Yukon, this panel will give you a taste of Southern living.

### 90 COE Glass

White Iridescent for Moon, 16" x 7"

Cranberry Pink for Border, 9" x 14"

Petal Pink Opalescent for

Smaller Flower Petals and Fused Petals, 6" Square

Cranberry Pink Iridescent, Thin for Fusing on

Top of Base Petal Pink or Pink, 3" x 3"

Opalescent Pink for Fused Petal Base and Larger Petals, 5" x 5"

White/Pink Opal Streaky for Flower Petals, 5" x 5"

Spring Green for Leaves and Base of Flowers, 3" x 3"

Charcoal Gray for Branches 8" x 4"

### Tools and Materials

Toothpicks Craft Glue or Glastac Gel

60/40 Solder 3/16" Silver-Backed Copper Foil

Flux Remover Steel Pushpins

1/4" Zinc U-Came Horseshoe Nails

Precision Pointed Cotton Swabs

Black Patina Soft Rags Old Toothbrush

Hanging Hooks Kem-O-Pro Polish

Flux Ring Saw Zinc Saw



1

*Make two copies of the pattern, one for layout and one to cut apart.*



2

*Cut out the glass pieces.*



I suggest cutting the moon, border, and background glass first, then the blossoms and leaves. You will find some of these cuts are a lot easier if you use a ring saw. Any sections that will be fused should be cut outside the pattern line to compensate for shrinkage during firing.

3

*Grind all of the cut sections, keeping the sections that will be fused larger than the pattern piece as mentioned in step two.*



4

*If you are fusing (layering) any of the petal sections, secure the layers of glass with a tiny dot of adhesive.*



A toothpick works well in applying a small amount of craft glue or Glastac Gel.

5

*Fuse the layered glass petals.*



It is up to you whether to full-fuse or just tack-fuse. I chose to tack-fuse in order to give some dimension to the petals.

Vent the kiln until it reaches 1000°F, then shut the kiln and slowly ramp up to between 1350°F and 1450°F. Check your progress, and when you are satisfied, turn off the kiln and let it cool to room temperature before opening it again.

6

*Wrap each section of glass in the silver-backed copper foil and place the glass on the pattern.*



Adjust any pieces that are oversized by regrinding.

7

*Secure the panel with steel pushpins.*



When all of the sections of glass are foiled and in place on the pattern, secure the glass using steel pushpins to keep the glass from shifting during soldering.

8

*Solder the panel.*



Apply flux to the panel and solder the panel together on both sides. Remove the flux when you are finished soldering using flux remover.

9

*Frame the panel with 1/4" zinc U-came.*



If you choose to add wood framing to the finished panel, you will still need to strengthen the panel with 1/4" zinc framing. If the zinc will be your only framing, use a slightly larger size zinc.

Cut the zinc for the arch and for the bottom of the panel using a zinc saw. Secure the zinc with horseshoe nails, going completely around the panel. Solder the arched section to the bottom corners and solder wherever a joint meets the zinc. Do this on both sides of the panel.

*If you have chosen to have only zinc framing, add decorative hanging hooks to the panel.*

10



Support the hooks for soldering using a piece of scrap glass beneath the hook and butt the hooks against the zinc. Apply flux and solder the hooks securely on each side of the arch.

11

*After the panel is soldered and cleaned, apply black patina to the solder lines.*



I use precision pointed cotton swabs, which makes getting the patina into the small areas of the flowers much easier. Clean off the patina residue from both sides of the panel when you are finished.

12

*Wax and polish the panel.*



With a soft, clean rag, apply Kem-O-Pro polish to one side of the panel. Let it dry to a soft haze, then flip the panel and repeat the process. When the wax is dry, use another soft rag or cloth to carefully polish the glass. This is where an old toothbrush is handy for removing wax from tight spaces.

13

*Create a template of the panel to use when selecting the wood frame if you have chosen to use one.*



Pink magnolias are said to symbolize youth, innocence, and joy. I personally do not possess either of the first two. However, the panel I built does give me joy. These magnolia blossoms offer glistening beauty and a fragrance that goes unmatched. Your panel will indeed offer glistening beauty, but in order to have an intoxicating fragrance, you will need a scented candle and a fine glass of wine.

GPO



*With a main focus in drawing and painting, Leslie Gibbs enjoys transforming her more traditional artwork into glass. Charmed by both wildlife and the creatures of the sea, she often depicts the real along with the fanciful denizens of these worlds in her design and pattern books.*

*Leslie and Jon are longtime Florida residents. They currently live and work in a small beach town in Northern Florida, having forsaken the Badlands of South Florida for a more peaceful lifestyle featuring more wildlife and less concrete. A relentless jokester, the artist tackles life's common absurdities with a wicked sense of humor and a relaxed attitude. Visit [www.facebook.com/lesliegibbsstudio](http://www.facebook.com/lesliegibbsstudio) to learn more about Leslie and her art.*

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# Butterflies, Hummingbirds, and Morning Glories

*Design by Michal Adams, Fabrication and Text by Cindy Dow Savary*

Photography by Cindy Dow Savary and Gerry L. Savary



Every artist has his or her own distinct style. What I love about Michal Adams' patterns are her flowing lines and attention to detail, which give her patterns depth and realism. I was excited to make this piece, because this pattern had never been fabricated. Not even the artist herself had completed it.

When you work on a Michal Adams pattern, you can count on her for advice. On some of her patterns, she even gives helpful hints. You can find more of her patterns on her Facebook page, Michal's Stained Glass Patterns at [www.facebook.com/groups/707382752927911](https://www.facebook.com/groups/707382752927911). I started using Michal's patterns because someone challenged me to go outside my comfort zone and complete a panel bigger than 25 pieces. Their question to me was why I wasn't doing at least a 90-piece panel.

Today, I'm still a little apprehensive when starting a pattern that has a lot of pieces, especially small and hard to cut pieces. With experience, however, I have learned how to alter a pattern to fit my skill level. I first look to see if all the lines are cuts that I can make. You can always add or subtract lines. For the lines that look difficult, I sometimes use glass that is easy to cut. When a pattern has a lot of small pieces, I have also enlarged the pattern. Whatever changes are necessary, I always color the pattern with colored pencils or crayons. This helps me to visualize what glass colors I want to use. It's also great for separating pattern pieces by glass color. Before you start, you'll need to make two copies of the pattern, one to cut apart for cutting the pieces of glass and the other to use as a layout copy.



### Wissmach Glass Company

286MY Medium Yellow Green Mystic for Leaves, 1 Sq. Ft.

#### Additional Glass

Jade Green Opal for Hummingbird Body and Head, 1/3 Sq. Ft.

Sapphire Blue Tint for Outside Circle Background, 2 Sq. Ft.

Tekta Clear Cathedral for Inside Circle Background, 1/3 Sq. Ft.

Amethyst for Butterfly Wings, 1/3 Sq. Ft.

Dark Blue Opalume for Flower Petals, 2/3 Sq. Ft.

Sunflower Opal for Circle, 2/3 Sq. Ft.

Teal Green Rough Rolled for Hummingbird Wings, 1/3 Sq. Ft.

Dark Blue Solid Opalescent for Flower Petals, 2/3 Sq. Ft.

#### Additional Scrap Glass

FireLight White for Flower Centers

Cerise Ruby Hammered for Hummingbird Throat

Brown for Butterfly Body

Yellow for Flower Centers

Orange Inferno Pearl Opal for Butterfly Wings

Orange Opal for Butterfly Wings

Grey for Hummingbird Beaks

Neo Lavender for Circles on Butterfly

#### Tools and Materials

Foil Pattern Scissors Toyo Pistol Grip Cutter

Grozing Pliers Running Pliers Grinder

Permanent Markers Push Pins

Rubbing Alcohol Morton Layout Block System

Paper Towels X-Acto® Knife

7/32" Black-Backed Copper Foil

13/64" Black-Backed Copper Foil

Aanraku Foil Burnish Roller

Lathekin/Plastic Fid Nokorode Paste Flux

60/40 Solder Hakko FX-601 Soldering Iron

Safety Glasses Kwik-Clean

Nitrile Gloves JAX Pewter Black

Novacan Black Patina Cotton Rounds

Cotton Swabs Liva Stained Glass Polish

Horseshoe Nails Hammer Handy Hangers

1/2" U-Channel Zinc Came Scotch-Brite™ Pad

*Cut out the pattern pieces on one of the copies of the pattern and glue the pattern pieces to the glass.*

1



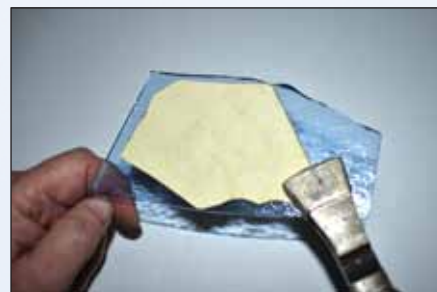
*Score as close to the pattern as possible.*

2



*Use running and grozing pliers, as needed, to separate and remove any excess glass.*

3



*Grind the glass pieces to smooth out any rough edges.*

4



Some cuts will require using a 1/4" grinder head.

5

*Place the pieces of glass on the layout copy.*



I use the Morton Layout system to keep all of the pieces in place.

6

*Clean each piece of glass with rubbing alcohol and dry, then apply the foil to all of the glass pieces.*



I use 7/32" foil on the thicker/bigger glass pieces and 13/64" foil on smaller/thinner glass pieces. For the pieces with inside curves, first place several pieces of foil on the curve, then foil on the edge as you normally would.

7

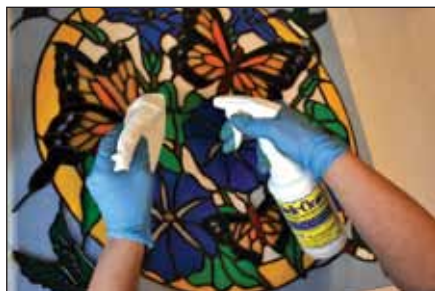
*Tack-solder, then finish-solder the pieces.*



Apply flux to the copper foil lines, then tack-solder each joint before running a smooth raised bead of solder on the front and back.

8

*Thoroughly clean the panel using Kwik-Clean to remove any residual flux.*



9

*Apply Novocan black patina to the solder lines.*



Be sure to wear gloves. Afterwards, clean the piece again with Kwik-Clean.

10

*Polish the panel.*



Add a thin layer of Liva Stained Glass Polish and let it dry. Wipe off the polish using cotton rounds. For those hard to get places, use cotton swabs.

11

*Mark the direction of the cut on the U-channel zinc came before using the 2" cut-off saw.*



12

*Use a plastic fid or Lathekin to open up the channel on the U-channel zinc came.*



13

*Use a hammer to secure the glass into the U-channel zinc came.*



In order to add Handy Hangers, cut a notch in the U-channel zinc came at both ends of the top piece.

14

*Apply flux where the soldered lines meet the U-channel zinc came and solder.*



Before soldering the U-channel zinc came at the corners, place tape between the seams. This makes for a cleaner solder line.

15

*Add the Handy Hangers or omit the final two steps if using a wood frame.*



Tin the Handy Hangers with solder. Also, apply flux and solder to the inside of the U-channel zinc came where the Handy Hanger will be secured. Then add the top U-channel zinc came with the notched ends and solder the seams.

16

*Scuff up the U-channel zinc came with a Scotch-Brite pad before adding JAX Pewter Black to the came to finish.*







Cindy Dow Savary has always had a passion for art and has been a crafter all of her life. After retiring in August 2017, Cindy took her first stained glass class in April 2018, and by June 2019, her work was exhibited at the City of Round Rock Texas Library. From that showing, Cindy received her first commission to repair and enlarge a piece that would become part of a new Airbnb called Annabella's Studio. The client wanted to honor the memory of her friend, the original artist.

Cindy has continued to create panels to honor the memories of loved ones including her mother, who died in 1959. With the help of a friend, Michal Adams, Cindy was able to create a panel after one of her mom's oil paintings, Zinnias in a Vase.

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# Pads and Critters

*Design by Paned Expressions Studios, Text by Darlene Welch*



This beautiful 22" x 14" stained glass design is one of the many lovely patterns included in the collection from Paned Expressions Studios, *In Full Bloom I*. The nearly 80 designs that are part of this pattern CD include floral transoms, sidelights, doors, entryways, and fireplace screens. Also included is a collection of panels that feature Victorian designs, a Gothic floral, and a charming design of a little girl taking the time to smell the roses in her garden.

All of the patterns are provided in color plus black-and-white versions in JPG, TIF, and GlassEye formats for PC and Mac for easy resizing, reshaping, and recoloring. The designs also cover all levels of glass skills, so there is something for everyone. Visit [www.panedexpressions.com](http://www.panedexpressions.com) for this and many other stunning pattern collections from Paned Expressions Studios. **GPO**

## Wissmach Glass Co.

- 156-LL Dark Purple/Green/Light Opal/Crystal Streaky for Cattails, Scrap
- 7-D Gold Pink/Dense Opal/Crystal for Flowers, 1-1/2 Sq. Ft.
- 1-L Silver Yellow/Light Opal/Crystal for Flower Centers, Scrap
- 23-L Light Green/Light Opal/Crystal for Water Lily Pads, 1 Sq. Ft.
- 100-L Dark Green/Light Opal for Cattail Leaves, 2 Sq. Ft.
- 61-L Green/Brown/Light Opal/Crystal for Cattail Leaves and Stems, 1 Sq. Ft.
- 243-LL Dark Blue/Yellow Green Streaky for Water, 1 Sq. Ft.
- 197-D Dark Blue/Medium Green/Dense Opal/Crystal for Sky, 2 Sq. Ft.
- WO-251 Aqua Green/Purple/Opal/Crystal Wisspy for Dragonfly Wings, Scrap
- WO-503 Opal/Dark Gray/Brown Wisspy for Dragonfly Body, Scrap
- WO-245 Medium Amber/True Green Streaky/Opal/Crystal Wisspy for Frog, Scrap

## Tools and Materials

7/32" Copper Foil Flux Solder  
Black Patina 1/2" U-Channel Zinc

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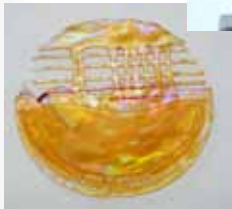
A photograph of a green lizard with yellow spots and red-tipped toes, positioned on a white surface.

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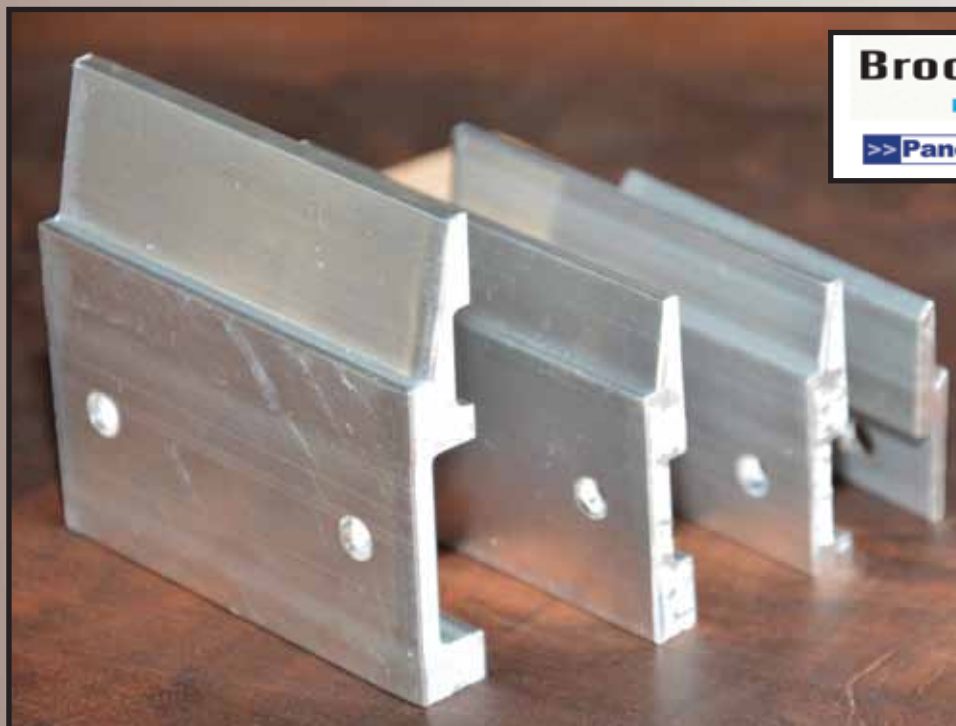
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# The Green Man

*Design, Fabrication, and Text by David Kennedy*

Photography by Sharon Kennedy



The Green Man is a 2,500-year-old pagan icon associated with rebirth and the cycle of growth in spring. It also has strong connections to the Celtic tradition of the fertility of the land. At the birth of Christianity, it was embraced by the Catholic Church as a symbol of death and resurrection.

The icon can be found today in jewelry, on wall plaques, and in stained glass panels. This is a project that can be made and hung in your window to serve as a timely reminder of the fragility of our planet.



### Wissmach Glass Company

EM161 Light Olive English Muffle

for Background, 1 Sq. Ft.

12-LL Copper Red/Light Opal/Crystal Streaky

for Moustache and Center Piece, 1/4 Sq. Ft.

WO-152 Yellow Green/Dark Green/Opal/Crystal Wispy

for Outer Foliage, Scrap

101-D Dark Green/Dense Opal/Crystal

for Inner Foliage, Scrap

EM343 Green English Muffle for Eyes, Scrap

320 Dark Green Cathedral

for Numbers 1, 3, 4, 6, 7, and 9 Leaves, 1/4 Sq. Ft.

WO-704 Medium Green/Brown/White Wispy

for Numbers 2, 5, and 8 Leaves, Scrap

708-LL Light Green/Dark Green Streaky

for Numbers 10, 11, and 12 Leaves, 1/4 Sq. Ft.

### Tools and Materials

7/32" Copper Foil Burnishing Tool

50/50 Solder 60/40 solder

4 X 4 C- or U-Channel Lead Came

3/4" Grinding Bit Water Soluble Flux

Tinned Copper Wire 0.5 mm Chain

Fine Permanent Marker Pen

Small Paintbrush Stiff Brush

Dish Detergent Black Patina

Start by making two copies of the pattern, one for using as a template and one for cutting out the glass pieces.

1



Using a square, make a mark on either side of the pattern.

2



You can use these as a reference point to attach the hooks to ensure that the finished panel hangs level.

3

Prepare a jig for building the panel.



Mine is approximately 12" in diameter. The finished panel will be hung in a window, and the jig will produce a nice, neat finish.

4

Cut the bottom six background pieces using the EM161.



Make sure the outer edge is a nice fit to the jig.

5

Add the leaves numbered 4, 6, 7, and 9 using 320 Cathedral and the leaves numbered 5 and 7 using WO-704 Wispy.



Cut the leaves in one piece at this point. They can be split when foiling takes place.

6

Next add the moustache pieces marked A plus the two background pieces on either side using the 112-LL Streaky.



7

Build up the center of the panel.



Use the 708-LL for numbers 10 and 11 leaves and the WO-152 for the pieces marked C. The pieces marked D can be cut out of the 101-D. Finally, cut the eyes using the EM343.

8

Continue cutting the leaf and background pieces.



Cut leaf number 12 using the 708-LL streaky, the pieces marked C using the WO-152 Wispy, the pieces marked D using the 101-D, and finally the two background pieces using the EM161.

9

*Cut out the remaining leaves.*



Finish off the cutting by adding leaves 1 and 3 using the 320 Cathedral and leaf number 2 using the WO-704 Wispy. Finally, cut the last two background pieces from the EM161.

10

*Foil all of the glass pieces.*



Once all the pieces are cut, foiling can commence. Remove the pieces from the template one at a time, apply the foil, and replace them on the template. Make any adjustments as you proceed. There is no need to foil the outside edges, since the lead came will cover that.

11

*Make sure the foil is well burnished onto the glass.*



I find that a putty knife is excellent for this procedure. Replace the pieces in the jig and make any adjustments as you proceed.

12

*With all of the outer pieces foiled, mark the center line on the leaves, cut them carefully, and foil.*



As you proceed, make any necessary adjustments.

13

*When all of the pieces have been foiled, apply flux to the seams and solder them flat using 50/50 solder.*



Remove the panel from the jig and repeat the fluxing and soldering process on the reverse side.

14

*Frame the panel with C- or U-channel lead came.*



Stretch a length of C- or U-channel lead came and cut a length approximately 39" for a 12"-diameter panel. This can be eased around the outside edge to provide a nice, neat finish.

15

*Complete the soldering.*



Reapply flux to the seams and use 60/40 to bead-solder the panel on both sides. Hooks can now be added. Use the marks on the pattern to make sure that the eyes line up level.

16

*Once all the soldering is complete, clean the panel using a tiny amount of dish detergent and warm water.*



A stiff brush will help to remove all the flux and solder residues.



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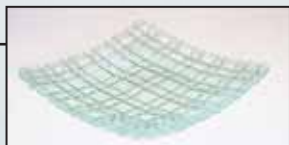
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*Fused Glass Lilies*  
March 12

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Business and Making Money*  
Lecture  
March 19



**Dennis Brady**  
*Fun with Float*  
March 26

**Cathy Claycomb**  
*Working with Solderfields*  
April 9



**Dennis Brady**  
*Coldworking*  
April 21

**Richard La Londe**  
*Float Glass with  
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Lecture  
April 23



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May 12

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17

Using a  
small paintbrush,  
apply black patina  
to the seams.



Let the patina dry for a couple of hours, then give the panel a final clean and polish. The completed panel can now be hung in a window of your choice.


**GPQ**

David Kennedy began his stained glass journey in 1984. After mastering the basics, he moved on to art glass, which has now become his passion. The artist doesn't use plating or painting techniques, preferring instead to take his inspiration from the glass itself.



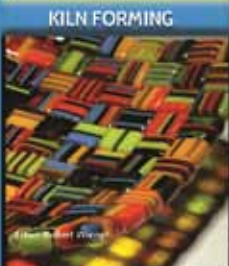
David is now in the process of publishing his original designs on [Etsy.com](https://www.etsy.com) with the help of his wife Sharon. They live on the Hook Peninsula, located in a rural historic southeastern section of Ireland, where he produces panels and designs in his own unique style.

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# Tulip Time

Design by Marianne Crivellaro, Text by Darlene Welch



When tulips appear, surely spring will be here soon. This 7-3/4" x 9" design captures a little maid admiring the perfect bloom to add to her spring bouquet. The pattern is part of the extensive collection that can be found in *The Ultimate Pattern Book Volume 1* by Marianne Crivellaro from Stained Glass Images. Over 300 projects in twelve different themes including Heaven Sent, All Stars, Celtic Crosses, Lead the Way, The Bear Essentials, and seven other categories provide something for everyone from beginners to intermediate level glass enthusiasts.

The glass colors used for this suncatcher are listed here, but don't be afraid to experiment with different glasses to fit your own decor or to create a gift in the favorite color scheme of a special friend. Careful selection of glass types, colors, textures, and grain direction all help your glass art come to life.

**GPQ**

## Wissmach Glass Co.

### All Glass from Scrap

- 277-L Medium Blue Light Opal/Dark Blue for Dress
- 707-LL Light Blue/Dark Blue Streaky for Bottom Edge of Dress
- 77-L Light Brown/Yellow Green/Light Opal for Hat and Shoes
- 1-D Silver Yellow/Dense Opal/Crystal for Hat Ribbon
- 58-L Medium Amber/Opal/Crystal for Hand and Legs
- 25-LL Orange/Green/Opal/Crystal Streaky for Flower
- 100-sp Dark Green/Light Opal for Leaves
- 163-LL Medium Purple/Medium Green/Opal/Crystal Streaky for Border

### Tools and Materials

- |                     |             |               |              |
|---------------------|-------------|---------------|--------------|
| 7/32" Copper Foil   | Flux        | Solder        | Black Patina |
| 1/4" U-Channel Lead | Copper Wire | Handy Hangers |              |

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# Reverse Engineering

## Analyzing Glass Art to Expand Your Artistic Skills

by Dennis Brady

**R**everse Engineering has been defined as, “Taking an object apart to see how it works in order to duplicate or enhance the object.” It’s something many glass artisans do as part of their learning experience and something all glass artisans, whether amateur or professional, *should* do. Sadly, too few are willing to make the effort but instead look for a tutorial to explain how to make something they would like to copy rather than try to teach themselves by practicing reverse engineering.

This is probably the best of all ways to expand your personal skills. It not only helps you understand the process of different techniques but also encourages you to analyze how projects are done and examine how combining different techniques creates different effects.

Just as being good at crossword puzzles requires you to have a good understanding of the meanings of different words, being good at reverse engineering glass art requires that you have a good understanding of the different ways glass responds to heat. Practicing reverse engineering is an excellent way to improve your understanding of how different glass art effects are created.

### A Personal Challenge

Exploring reverse engineering is something you should undertake as a personal challenge. It’s a process of self-education. When you look at someone else’s work or a photo of a glass art piece, try to figure out how it was made. However, don’t just try to figure out how it was made. Also try also to figure out other ways it could have been made.

Study it and mentally take it apart. Build it backwards. Then think about ways to build it in different ways. As with all skills, the more you practice reverse engineering, the better you get at it. Perhaps it should be a key part of the education program for every glass artisan.

### Analyze

When you think you have figured out how a piece was done, take a moment and review your opinions, asking yourself the following questions.

- Is your analysis correct?
- Have you made assumptions that might not be valid?
- Are you assuming it was done using traditional techniques?
- Are there reasons those techniques would not have worked?
- Are there other ways it could have been done?
- Could the piece have been done with different materials?
- Does it matter what order the project is done in?

### Practice the Concept of Reverse Engineering

Practicing reverse engineering is an exceptional way to expand your personal understanding of glass art techniques. It not only helps you understand the different processes involved in the creation of a piece but encourages you to apply logic and reason in order to understand causes and effects in glass art as well.

To help you practice this concept, here are some samples for you to examine. Some are relatively conventional, but others include using some more unusual techniques. Study the photo and build it backwards in your mind to figure out how it was done. There might be just one way, or there might be several different ways to achieve the same result.



*Donut Bowl*



## Donut Bowl

Donut Bowl Explained:

### *Pebbles*

- Premade 1/2"-diameter black pebbles
- Premade assorted colors of 1"- and 1-1/2"-diameter pebbles

### *Fuse*

- A 12"-diameter clear glass round set onto a 12"-diameter black round
- Colored pebbles placed on top
- Black pebbles placed on top of the colored pebbles
- Fired to a full fuse. A 30-minute hold is needed to provide enough time to melt the pebbles flat.

### *Slump*

- The project is slumped into a ceramic mold.

## Purple Pebbles

Purple Pebbles Explained:

### *Assembly*

- A 12" x 12" square of purple glass set onto a 12" x 12" square of clear glass
- Assorted sizes of premade clear glass pebbles set on top of the purple glass

### *Fuse*

- Fired to a full fuse with a 30-minute hold to allow the pebbles time to fully melt in

### *Slump*

- The project is slumped into a ceramic mold but could also have been draped over a steel mold.

### *Explanation*

This isn't so much a special technique as it is understanding that when clear glass is melted into a colored glass, it produces a dilute variant of that color.



*Purple Pebbles*

## Comedy/Tragedy

Comedy/Tragedy explained:

### Casting

- A 16"-diameter round of black glass placed in a 16"-diameter steel mold
- Scraps of black iridescent glass placed iridescent side up to fill the mold
- Scraps of clear glass piled on top of the iridescent pieces with enough glass to ensure a full covering
- Fired to a full fuse with a lengthy hold to fully melt and spread out all the glass pieces

### Cold Work

- Glass edges ground to smooth out the texture left from the fiber paper

### Fuse

- Fired again to a full fuse to round off the glass edges

### Sandblast

- A vinyl stencil applied and the desired design blasted into the glass

### Paint

- While the vinyl sandblasting stencil is still on, brush off any grit residue and spray paint. When the paint is dry to tack, remove the stencil. The surface roughened by the sandblasting provides an excellent base for painting on glass.

### Special Considerations

The black base ensures that any spaces between the iridescent pieces will appear as black. If a clear base had been used, clear spaces would be seen between the pieces.

### Alternatives

Instead of firing a second time to round off the glass edges, it could have been cold worked to a smooth edge. Rather than painting after sandblasting, the sandblasted design could also have been painted with mica or enamels and fired to fuse the design.

GPQ

*Dennis Brady has been a full-time professional glass artisan since 1980 and currently works with stained glass, fusing, casting, glassblowing, and sandblasting. He has authored and published six books of stained glass patterns plus A Lazy Man's Guide to Stained Glass. Along with his sons, Dane and Jason Brady, he operates several companies. DeBrady Glassworks produces glass art; Victorian Art Glass sells tools, equipment, and supplies; and Master Artisan Products manufactures molds and tools for glass artisans. He has also created the website Glass Campus, which offers over 100 tutorials and videos teaching numerous glass art techniques as well as tips on how to make a living as a glass artisan.*



*Dennis teaches extensively in his home studio in Victoria, British Columbia, Canada, and as a guest instructor in several other countries. He is also a contributing artist to GPQ's live and recorded Glass Expert Webinars™ and Master Glass Artisan Lecture Series™. His "push the boundaries" approach to experimentation and innovation is always, "How fast can I go until I skid into the ditch?" Visit [www.debrady.com](http://www.debrady.com) to learn more about Dennis and his art.*



*Comedy/Tragedy*

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Dan Friday featured on the cover of the March/April 2020 issue of Glass Art®. Photo by Ian Lewis.

Also featured in this issue marbles by Sabina Boehm.



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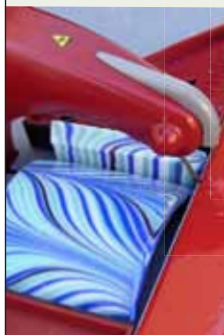
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# Bird of Paradise

*Design by by Dionē Roberts, Text by Darlene Welch*

**B**ird of paradise flowers have provided inspiration for many works of fine art. This free-form 12" x 18" stained glass design from the pattern book *Contemporary Florals* by Dionē Roberts perfectly captures the essence of a tropical beauty that is believed by people around the world to represent joy, freedom, and paradise. After cutting, these flowers can last for up to two or three weeks, but this stained glass beauty will last a lifetime.

In describing this collection, the artist shared: "For years we have used fresh flowers to add beauty, color, and grace to our homes, and for years, floral designs have also been a favorite motif for glass artists. This collection represents a unique approach that combines the freshness and spontaneity of a floral display with the timeless beauty and intensity of stained glass." Visit [www.facebook.com/dione.roberts](http://www.facebook.com/dione.roberts) to learn more about this talented Montana artist and her designs.

**GPQ**



## **Wissmach Glass Company**

100-L Dark Green/Light Opal for Leaves, 1 Sq. Ft.  
61-L Green/Brown/Light Opal/Crystal for Stems, Scrap  
119-L Cobalt Blue/Light Opal/Crystal for Flowers, Scrap  
WO-503 Opal/Dark Gray/Brown Wisspy for Flowers, Scrap  
1-L Silver Yellow/Light Opal/Crystal for Flowers, Scrap  
WO-17 White Opal/Red/Orange Wisspy for Flowers, Scrap  
256-L Pastel Green Light Opal/Blue/Red for Background, 2 Sq. Ft.

## **Tools and Materials**

7/32" Copper Foil   Flux   Solder  
Black Patina   1/4" Lead U-Channel  
Handy Hangers   Copper Wire

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# Spring Is Here

*Design by Terra Parma, Text by Darlene Welch*



This delightful 7" x 8-1/2" stained glass design from Terra Parma is a reminder of happy times spent watching the birds return in spring. The pattern is one of eleven from Terra's book *Images*, which includes a carousel horse, pair of ducks, waterfall, heart design, dragonfly, stars & stripes, flower bouquets, and more.

The free-form outer border adds interest to the project. Careful placement of the glass grain to match the direction of the pattern pieces also helps to add realism and depth to the scene. You may even want to get your creative juices flowing as you select your own glass colors to personalize this charming suncatcher.

**GPQ**

## **Wissmach Glass Company**

*All Glass from Scrap*

- 118-L Cobalt Blue/Light Opal/Crystal for Bird Wing, Head, and Tail
- 2180-L Light Violet/Light Opal/Crystal for Bird Breast
- 1-D Silver Yellow/Dense Opal/Crystal for Feet and Beak
- Dense Black for Bird Eye and Hole in Birdhouse
- 55-L Amber/Green/Light Opal/Crystal for Birdhouse Sides
- 77-L Light Brown/Yellow Green/Light Opal for Birdhouse Roof
- WO-7 Gold Pink/Opal/Crystal Wisspy for Flowers
- 1-L Silver Yellow/Light Opal/Crystal for Flower Centers
- 100-sp Dark Green/Opal for Leaves

## **Tools and Materials**

- 7/32" Copper Foil Flux Solder
- Black Patina 1/4" U-Channel Lead Handy Hangers

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Pads and Critters

Design by Paned Expressions Studios

Wissmach Glass Co.  
156-LL Dark Purple/Green/Light Opal/Crystal Streaky for Cattails, Scrap  
7-D Gold Pink/Dense Opal/Crystal for Flowers, 1-1/2 Sq. Ft.  
1-L Silver Yellow/Light Opal/Crystal for Flower Centers, Scrap  
23-L Light Green/Light Opal/Crystal for Water Lily Pads, 1 Sq. Ft.  
100-L Dark Green/Light Opal for Cattail Leaves, 2 Sq. Ft.  
61-L Green/Brown/Light Opal/Crystal for Cattail Leaves and Stems, 1 Sq. Ft.  
243-LL Dark Blue/Yellow Green Streaky for Water, 1 Sq. Ft.  
197-D Dark Blue/Medium Green/Dense Opal/Crystal for Sky, 2 Sq. Ft.  
WO-251 Aqua Green/Purple/Opal/Crystal Wispy for Dragonfly Wings, Scrap  
WO-503 Opal/Dark Gray/Brown Wispy for Dragonfly Body, Scrap  
WO-245 Medium Amber/True Green Streaky/Opal/Crystal Wispy for Frog, Scrap



Enlarge to desired size

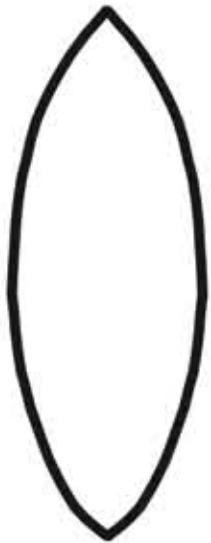
Daylily Flower Stem  
An Introduction to Stained Glass

Design by Lidia K. Anderson

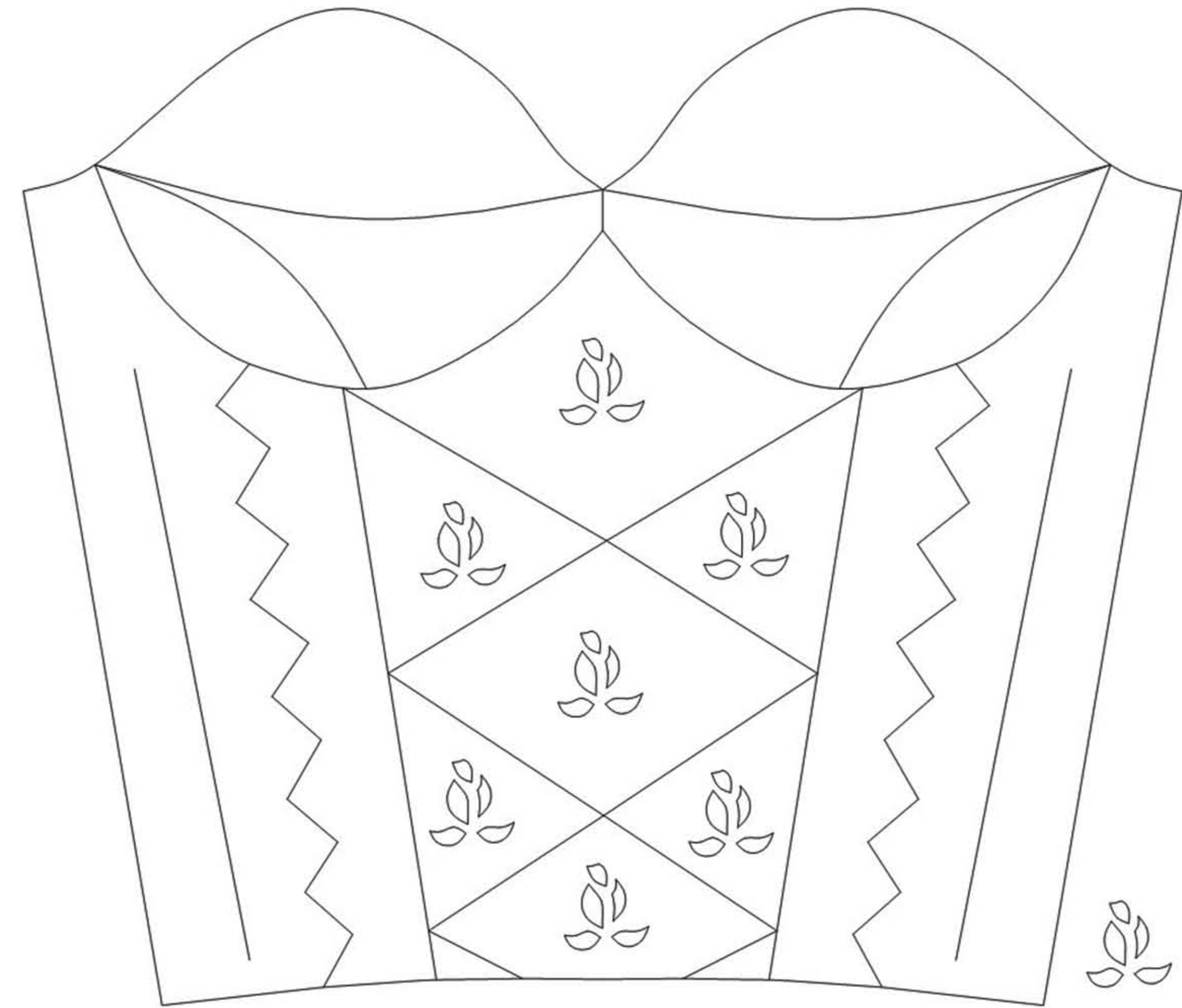
96 COE Glass  
Clear for One Layer, 1 Sq. Ft.  
Black for Design Sides, 1 Sq. Ft.  
1/4" Thick Clear Glass for Base, 1/4 Sq. Ft.  
1/4" Thick Clear Glass Rod for Base Riser, 12"  
96 COE Dichroic Glass  
Cyan Red Dichroic on Black for Bra Top, 1/3 Sq. Ft.  
Black Cherry on Black for Bra Underside, 1/3 Sq. Ft.  
Pixie Stix or Similar Pattern on Clear  
for Design Center, 1/2 Sq. Ft.  
Pattern Dichroic on Clear for Bra Accent, Scrap  
Border Firestrips on Black for Decorations, 12" Lengths (2)  
Assorted Wavy Firestrips on Black  
for Decorations, 6" to 14" Lengths  
Rainbow Noodles for Decorations, 2" to 12" Lengths

Fashionably Chic Corset

Design by Lisa Vogt



Pattern can be sized  
Cut 6

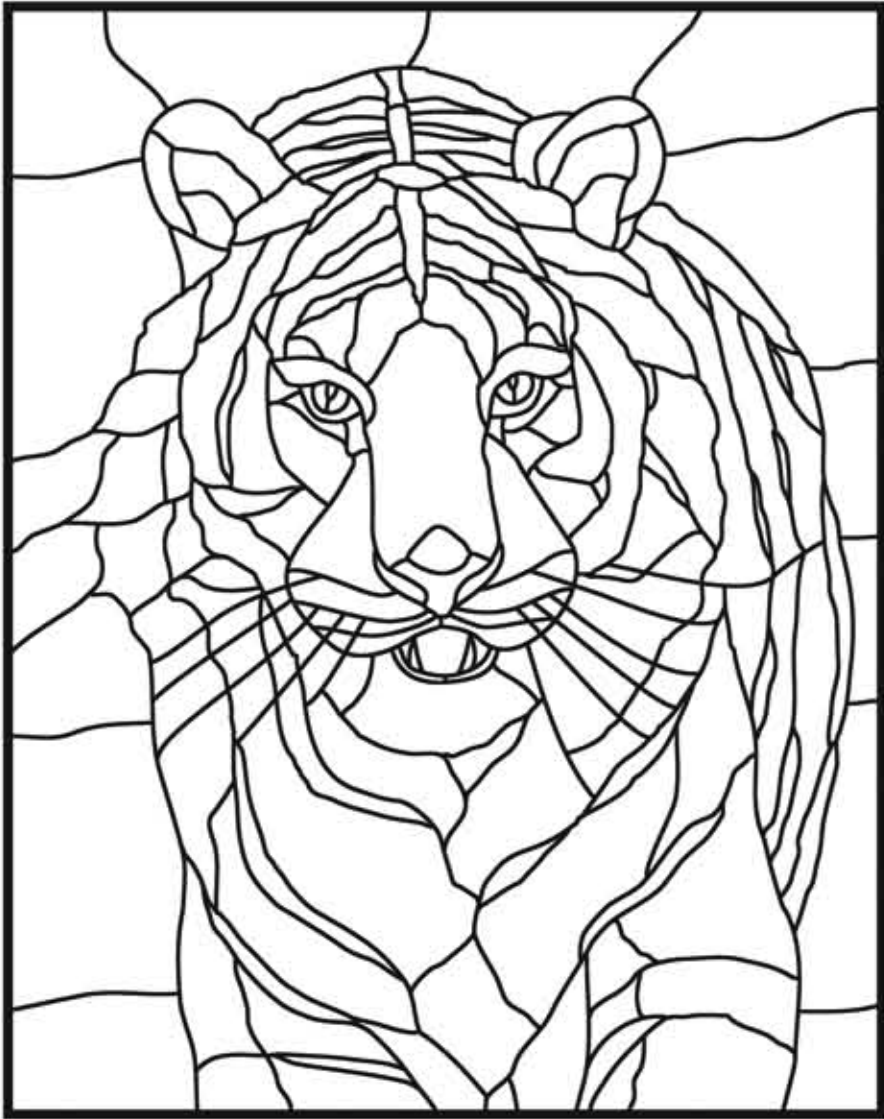


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Tiger

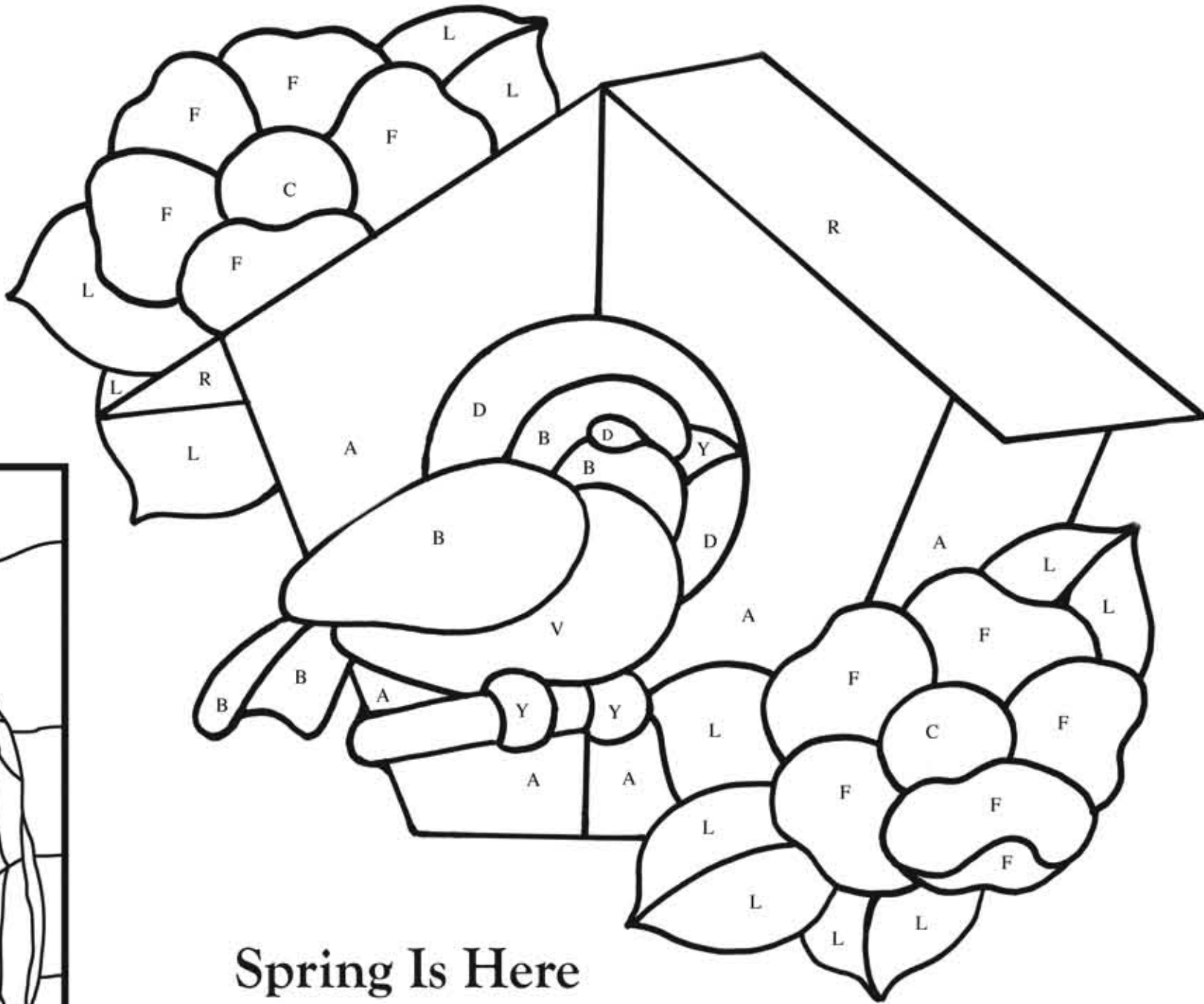
Design by Aanraku Glass Studios

Wissmach Glass Co..  
Black for Tiger Stripes, Mouth, and Ears, 1 Sq. Ft.  
01 Crystal for Teeth, Scrap  
WO-17 White Opal/Red/Orange Wispy  
for Tiger Body, 1 Sq. Ft.  
317-D Dark Amber/Dense Opal f  
or Tiger Body, 1 Sq. Ft.  
613-D Williamsburg Blue/Dense Opal/Crystal  
for Tiger Had and Ears, Scrap  
557-L Medium Gray/Light Opal  
for Tiger Head, Chest, and Ears, Scrap  
146-L Yellow Green/Light Opal/Crystal  
for Eyes, Scrap  
WO-238 Dark Purple/Dark Blue/Opal/Crystal Wispy  
for Background, 3 Sq. Ft.



Enlarge to desired size

Glass Patterns Quarterly®  
Pullout Pattern Sheet Spring 2020



Spring Is Here

Design by Terra Parma

Wissmach Glass Company  
All Glass from Scrap  
B - Cobalt Blue/Light Opal/Crystal for Bird Wing, Head, and Tail  
V - Light Violet/Light Opal/Crystal for Bird Breast  
Y - Silver Yellow/Dense Opal/Crystal for Feet and Beak  
D - Dense Black for Bird Eye and Hole in Birdhouse  
A - Amber/Green/Light Opal/Crystal for Birdhouse Sides  
R - Light Brown/Yellow Green/Light Opal for Birdhouse Roof  
F - Gold Pink/Opal/Crystal Wispy for Flowers  
C - Silver Yellow/Light Opal/Crystal for Flower Centers  
100-sp Dark Green/Opal for Leaves

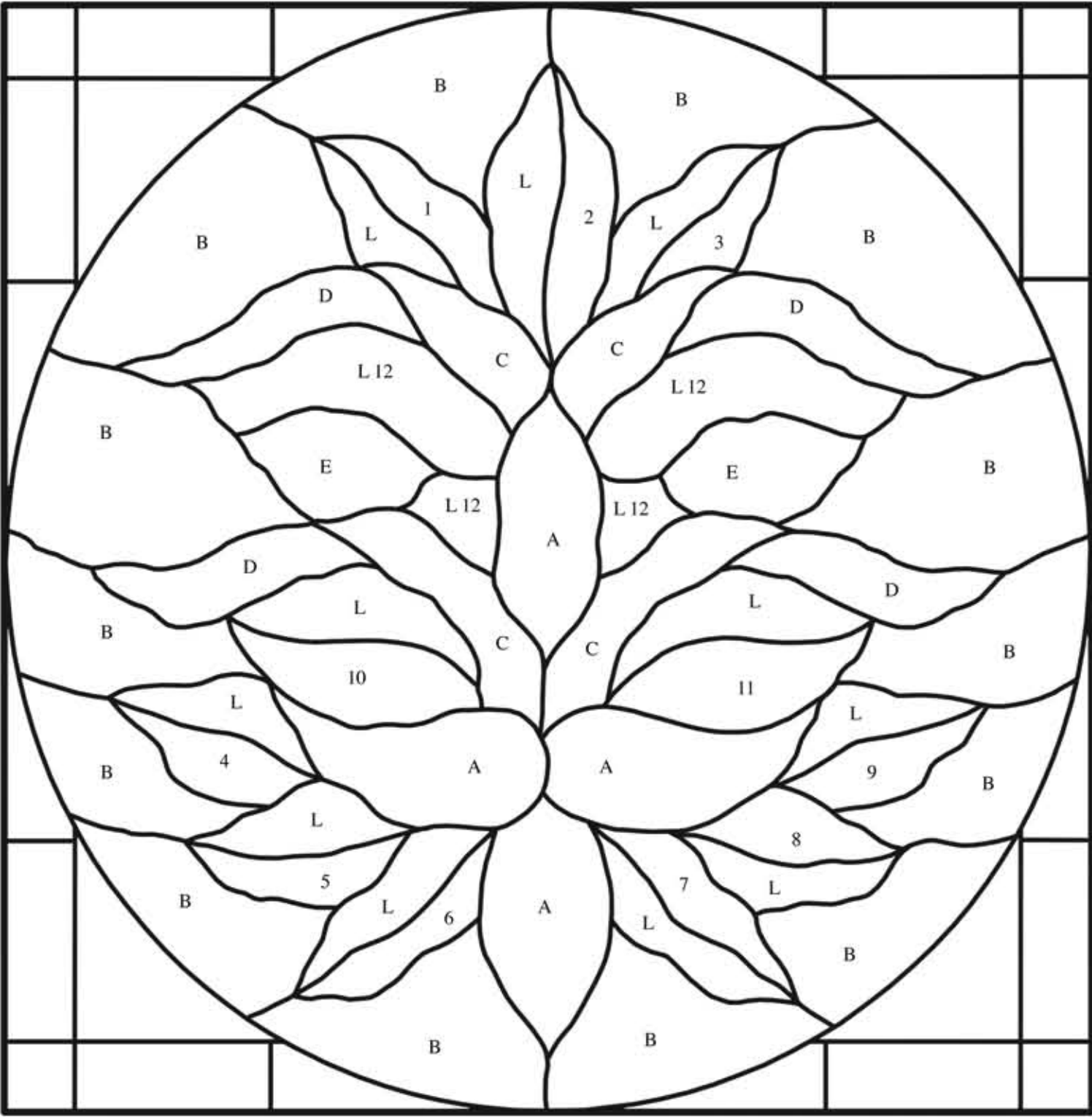
Pink Magnolia Magnificence  
Tulip Trees

Design by Leslie Gibbs



90 COE Glass  
White Iridescent for Moon, 16" x 7"  
Cranberry Pink for Border, 9" x 14"  
Smaller Flower Petals and Fused Petals, 6" Square  
Petal Pink Opalescent for  
Cranberry Pink Iridescent, Thin for Fusing on  
Top of Base Petal Pink or Pink, 3" x 3"  
Opalescent Pink for Fused Petal Base and Larger Petals, 5" x 5"  
White/Pink Opal Streaky for Flower Petals, 5" x 5"  
Spring Green for Leaves and Base of Flowers, 3" x 3"  
Charcoal Gray for Branches 8" x 4"



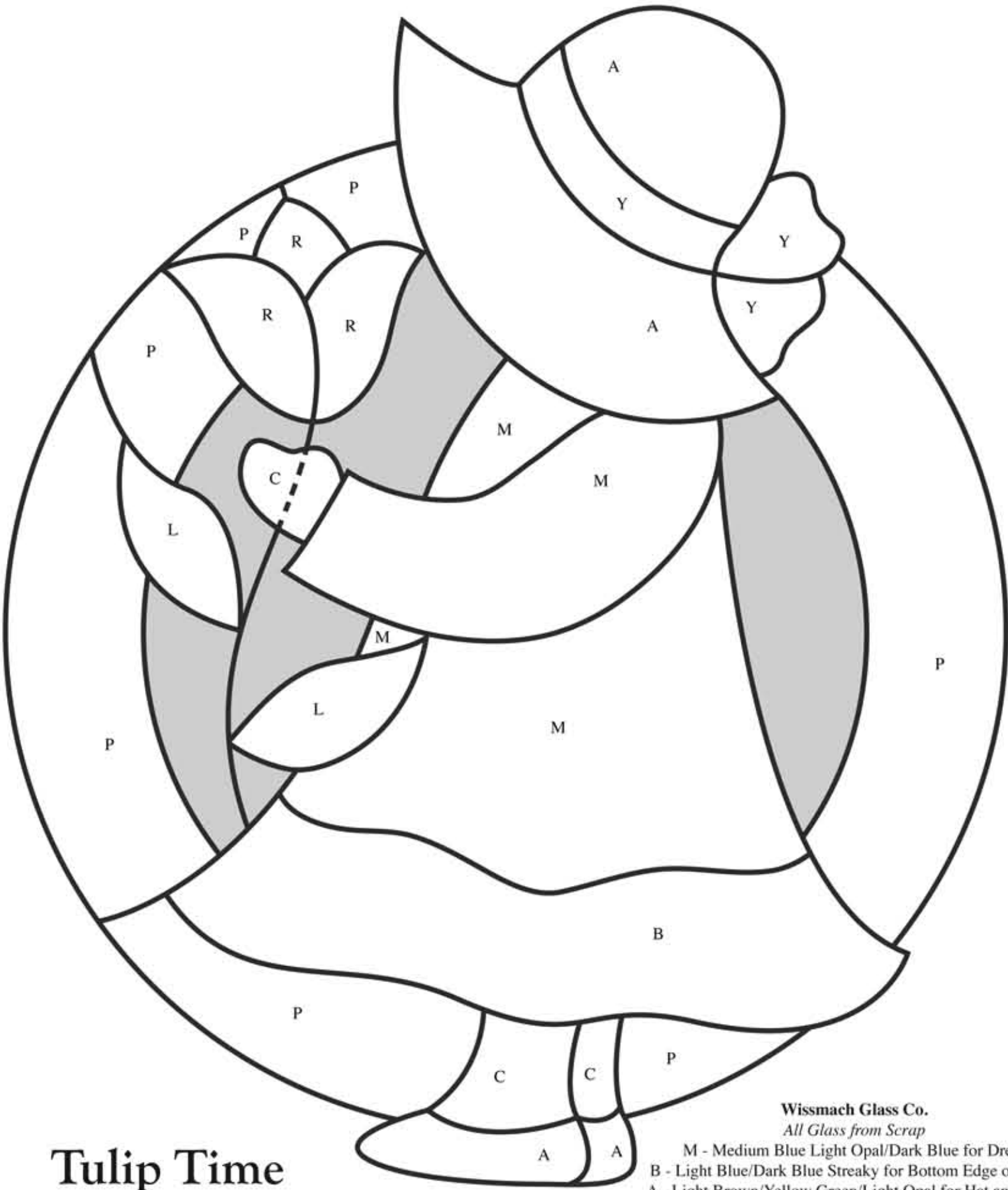


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**Wissmach Glass Company**  
EM161 Light Olive English Muffle  
for Background, 1 Sq. Ft.  
12-LL Copper Red/Light Opal/Crystal Streaky  
for Moustache and Center Piece, 1/4 Sq. Ft.  
WO-152 Yellow Green/Dark Green/Opal/Crystal Wissy  
for Outer Foliage, Scrap  
101-D Dark Green/Dense Opal/Crystal  
for Inner Foliage, Scrap  
EM343 Green English Muffle for Eyes, Scrap  
320 Dark Green Cathedral  
for Numbers 1, 3, 4, 6, 7, and 9 Leaves, 1/4 Sq. Ft.  
WO-704 Medium Green/Brown/White Wissy  
for Numbers 2, 5, and 8 Leaves, Scrap  
708-LL Light Green/Dark Green Streaky  
for Numbers 10, 11, and 12 Leaves, 1/4 Sq. Ft.

## The Green Man

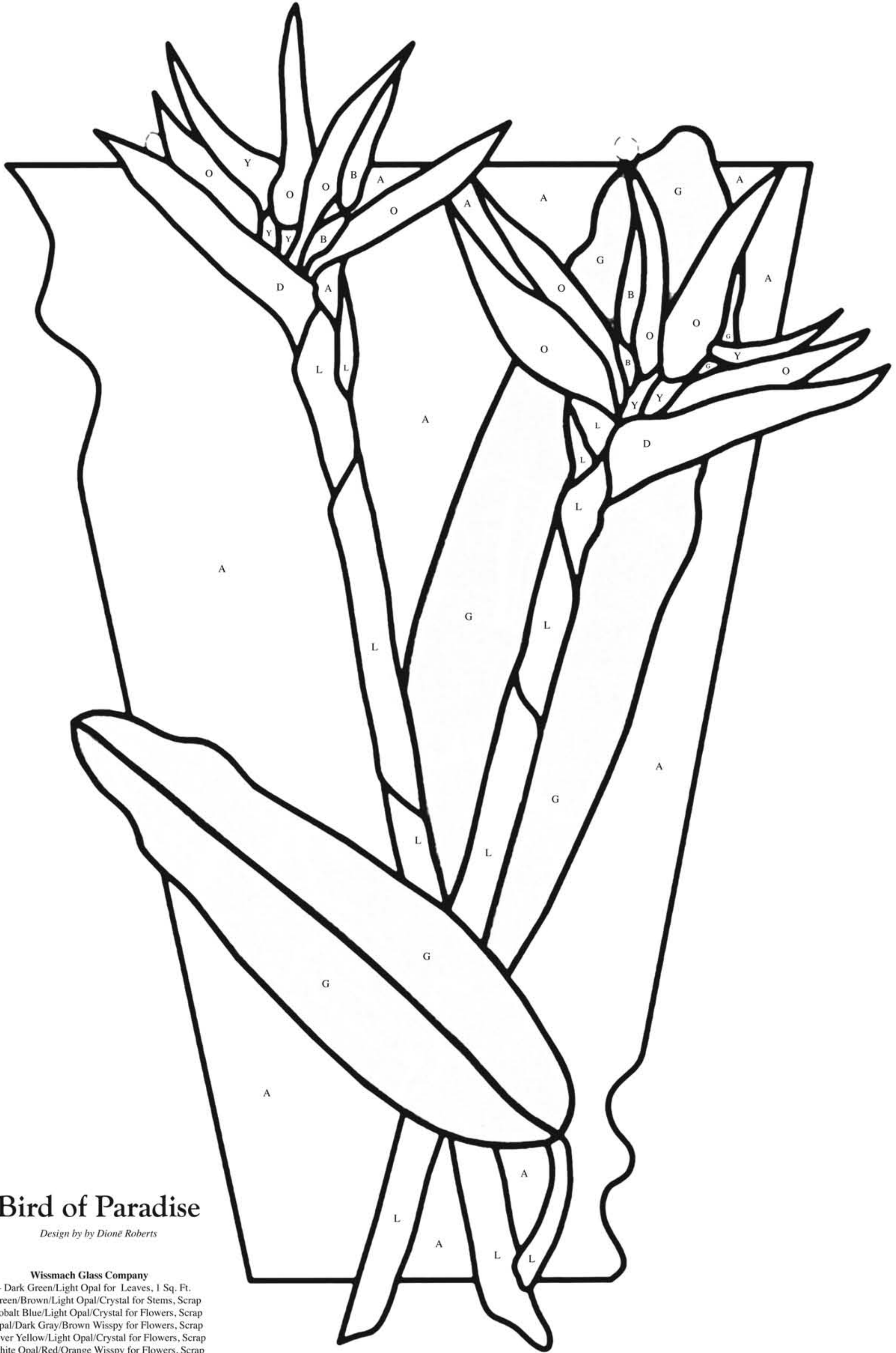
Design by David Kennedy



## Tulip Time

Design by Marianne Crivellaro

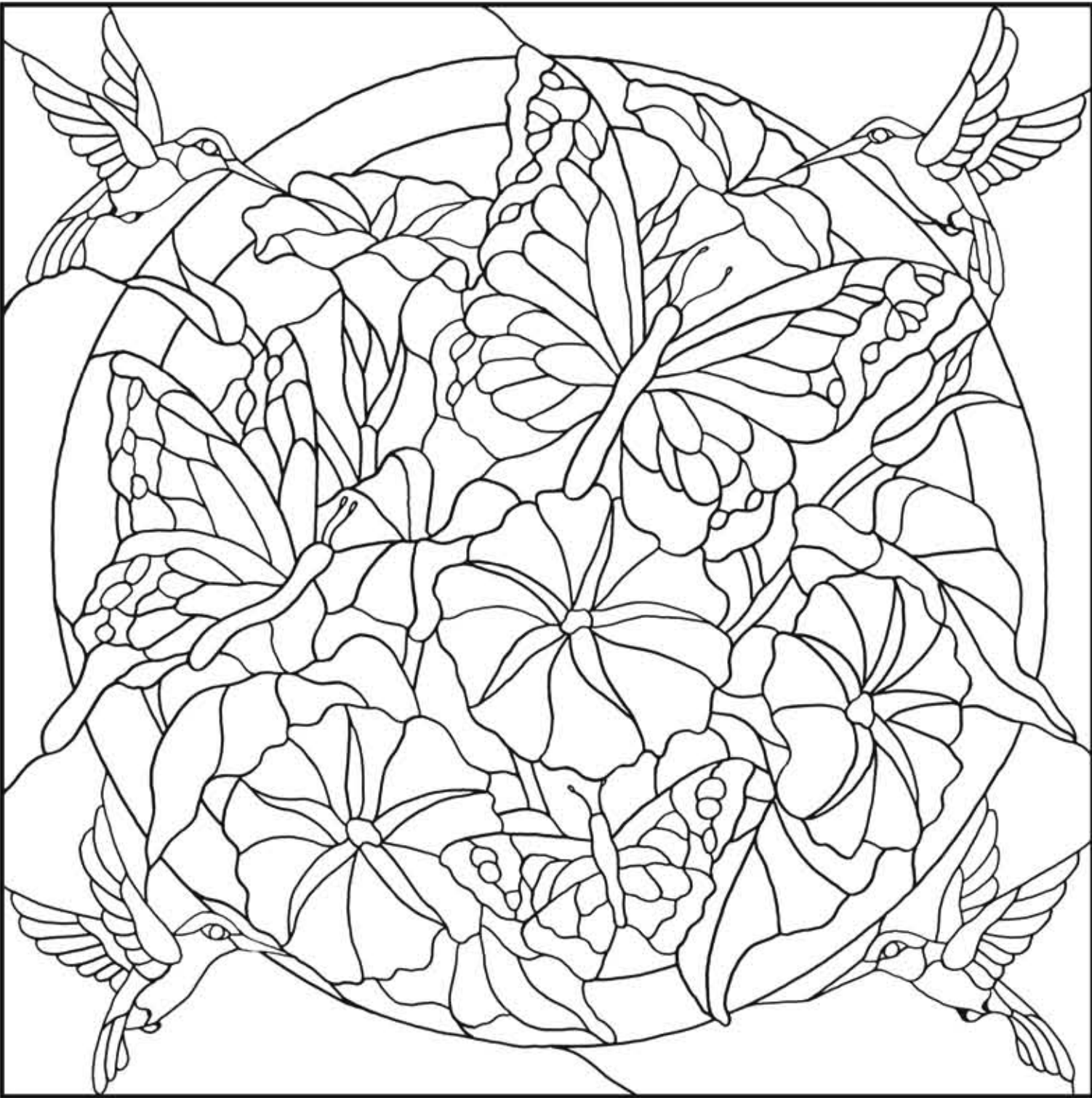
**Wissmach Glass Co.**  
*All Glass from Scrap*  
M - Medium Blue Light Opal/Dark Blue for Dress  
B - Light Blue/Dark Blue Streaky for Bottom Edge of Dress  
A - Light Brown/Yellow Green/Light Opal for Hat and Shoes  
Y - Silver Yellow/Dense Opal/Crystal for Hat Ribbon  
C - Medium Amber/Opal/Crystal for Hand and Legs  
R - Orange/Green/Opal/Crystal Streaky for Flower  
L - Dark Green/Light Opal for Leaves  
P - Medium Purple/Medium Green/Opal/Crystal Streaky for Border



## Bird of Paradise

Design by Dione Roberts

**Wissmach Glass Company**  
G - Dark Green/Light Opal for Leaves, 1 Sq. Ft.  
L - Green/Brown/Light Opal/Crystal for Stems, Scrap  
B - Cobalt Blue/Light Opal/Crystal for Flowers, Scrap  
D - Opal/Dark Gray/Brown Wissy for Flowers, Scrap  
Y - Silver Yellow/Light Opal/Crystal for Flowers, Scrap  
O - White Opal/Red/Orange Wissy for Flowers, Scrap  
A - Pastel Green Light Opal/Blue/Red for Background, 2 Sq. Ft.



Enlarge to desired size

## Butterflies, Hummingbirds and Morning Glories

Design by Michal Adams

**Wissmach Glass Company**  
286MY Medium Yellow Green Mystic for Leaves, 1 Sq. Ft.  
**Additional Glass**  
Jade Green Opal  
for Hummingbird Body and Head, 1/3 Sq. Ft.  
Sapphire Blue Tint  
for Outside Circle Background, 2 Sq. Ft.  
Tekta Clear Cathedral  
for Inside Circle Background, 1/3 Sq. Ft.  
Amethyst for Butterfly Wings, 1/3 Sq. Ft.  
Dark Blue Opalume for Flower Petals, 2/3 Sq. Ft.  
Sunflower Opal for Circle, 2/3 Sq. Ft.  
Teal Green Rough Rolled  
for Hummingbird Wings, 1/3 Sq. Ft.  
Dark Blue Solid Opalescent  
for Flower Petals, 2/3 Sq. Ft.  
**Additional Scrap Glass**  
FireLight White for Flower Centers  
Cerise Ruby Hammered for Hummingbird Throat  
Brown for Butterfly Body  
Yellow for Flower Centers  
Orange Inferno Pearl Opal for Butterfly Wings  
Orange Opal for Butterfly Wings  
Grey for Hummingbird Beaks  
Neo Lavender for Circles on Butterfly



# Tiger

*Design by Aanraku Glass Studios, First Rendering by Yoshinori Takao, Text by Darlene Welch*



Tigers, the world's largest members of the cat family, range across Asia all the way from Russia to Sumatra and Indochina. Just as in human fingerprints, no two tigers have exactly the same pattern of stripes. This 18" x 23" stained glass design from the *Aanraku Eclectic Volume 1* pattern collection by Hiroyuki Kobayashi and Jeffrey Castaline celebrates the power and beauty of these magnificent animals.

The complete pattern collection includes florals and nature themes as well as a Sumo Wrestler, Imperial Lady, Dolphin, Lighthouse, and more, and offers designs that are suitable for intermediate to advanced stained glass enthusiasts. Visit Aanraku Glass Studios at [www.aanraku.com](http://www.aanraku.com) to view the company's complete selection of pattern books and to learn more about Aanraku's Custom Pattern and Design Service.

**GPQ**

## **Wissmach Glass Co..**

Black for Tiger Stripes, Mouth, and Ears, 1 Sq. Ft.

01 Crystal for Teeth, Scrap

WO-17 White Opal/Red/Orange Wisspy for Tiger Body, 1 Sq. Ft.

317-D Dark Amber/Dense Opal for Tiger Body, 1 Sq. Ft.

613-D Williamsburg Blue/Dense Opal/Crystal for Tiger Head and Ears, Scrap

557-L Medium Gray/Light Opal for Tiger Head, Chest, and Ears, Scrap

146-L Yellow Green/Light Opal/Crystal for Eyes, Scrap

WO-238 Dark Purple/Dark Blue/Opal/Crystal Wisspy for Background, 3 Sq. Ft.

## **Tools and Materials**

7/32" Copper Foil Flux Solder

Black Patina 1/2" U-Channel Zinc

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# Fashionably Chic Corset

*Design and Fabrication by Lisa Vogt and Jessie Battin, Text by Lisa Vogt*

Spring is in the air! Freshen up your design style with this super fun, whimsical project that invites spontaneous creativity and artistic freedom. The beauty of this sculptural artwork is the combination of a racy form and glitzy materials.

## Cooperative Creativity

My daughter Jessie was over one afternoon, and we decided to “play” in my glass studio. I had this blank corset-shaped pattern lying on the table. I’d intended to make it for months, but you know how that goes. Commission jobs and other projects take priority over exploratory projects that I make for fun.

When Jessie saw the shapely outline, her eyes lit up and she smiled. I suggested we build it together. There are few things I enjoy more than sharing studio time with my kids. On that particular day, the attraction to this pattern was the suggestive object it represented and the blank canvas begging to be brought to life. A risqué corset was the perfect project for a collaboration between two confident creatives. Together we could make our own design as simple or as complicated as we wanted, and there was no pressure to create anything fancy. We could unwind and enjoy our time together, mother and daughter.



It’s hard to describe what it’s like when I’m feeling the creative flow. Time flies. Hours pass in what I thought were minutes. My naturally distracted mind is focused on what my hands are doing and nothing else. I get lost in my own world. When I return to reality, I feel rejuvenated and spiritually uplifted. That’s why I like sharing my studio space with others. I try to give them that experience and hope they feel the same inspiration and fulfillment that I do.

When we made this piece, we started with a blank pattern and a simple shape. We selected glass and materials as we went along, allowing ourselves the luxury of designing on a whim. The intricate pattern you see in the finished piece evolved organically. Jessie and I had so much fun adding one element at a time until we had something that we both fell in love with.



## Finding the Creative Zone

Designing from patterns is great, but often it's more mechanical than artistic. To really get into the creative zone you have to be one with the process—freely give your muse permission to wander and discover. It's in that mysterious place that you'll find the blissful creative experience that artists live for.

To enjoy this kind of artistic exploration, I'd suggest you use the pattern that Jessie and I ended up with as a loose guide. It took us hours to plan the arrangement, but they were hours of fun sprinkled with laughter.

You can follow our pattern, literally, since a corset made with *your* hands will have its own special flare. You can also go wild and throw caution to the wind. Use the primary lines of our design for inspiration, then design something new that reflects your personal artistic style. Let the materials you have on hand influence your design choices. Don't overcomplicate the fabrication process. Instead, trust yourself and have fun with it. We did, and our results were amazing.

## Free-Form Fascination

It's the unique free-form shape and the stylized details that make this corset so visually attractive. The corset is 10" tall x 11-1/2" wide. The base is 1/4" inch clear glass cut to 3" x 9" rectangles, with two 1/4"-thick rods cut to 3 inch lengths. Building the glass portion is straight forward. It's the same type of "two layers with accents" fused glass assembly that you've likely used numerous times. That's the reason I'm focusing this tutorial more on shape forming than on the glass fabrication. Here's a quick rundown on the glass assembly steps.

- Start by making a second copy of the pattern.
- Number both patterns the same.
- Cut out one paper pattern with scissors.
- Using the pattern as a guide, cut a single piece of clear glass the same shape and size.
- Grind the glass as needed to improve the edge quality.
- Clean and dry the cut clear glass and set it aside.
- Trace the whole pattern shape onto a primed or fiber paper-lined ceramic kiln shelf with a pencil. Set the shelf aside.
- Cut the paper pattern into pieces with scissors.
- Glue the paper onto your selected glass with a glue stick.
- Cut the glass as close to the pattern as possible and grind the cut pieces as needed to improve the fit.
- Clean and dry the cut glass, then assemble the cut glass pieces on the remaining whole paper pattern.
- Check the fit and grind as needed to improve it.

## Making the Embossed Rose Buds

To make the embossed details for the bodice, cut the rose bud design off of the corner of the pattern. Use a glue stick to glue the rose bud pattern onto a piece of stiff paper. I use file folders because they're readily available and sturdy enough to use multiple times.

Next make a stencil. Using an X-Acto knife, cut through the copy paper and stiff file folder paper to make a custom rose bud stencil. Using a pencil and the stencil, trace the shape of the rose bud onto a piece of 1/8"-thick fiber paper. Carefully cut the small rose bud pieces out of fiber paper with an X-Acto knife. Trace and cut a total of 7 fiber paper rose buds.

## Assembling and Fusing the Corset

Arrange the rose bud fiber paper sets on the ceramic kiln shelf. Be sure to place them where they'll be visible through the clear dichroic glass in the middle of the corset. Now arrange the cut glass pattern pieces on top of the fiber paper rose buds. Stack the single, clear cut glass on top of the glass pattern pieces. The clear cap protects the dichroic coating on the black-backed dichroic glass. It also gives the finished artwork a lustrous shine.

Decorate the top of the clear glass with dichroic Border Firestrips, Wavy Firestrips, and dichroic noodles.

### 96 COE Glass

Clear for One Layer, 1 Sq. Ft.

Black for Design Sides, 1 Sq. Ft.

1/4" Thick Clear Glass for Base, 1/4 Sq. Ft.

1/4" Thick Clear Glass Rod for Base Riser, 12"

### 96 COE Dichroic Glass

Cyan Red Dichroic on Black for Bra Top, 1/3 Sq. Ft.

Black Cherry on Black for Bra Underside, 1/3 Sq. Ft.

Pixie Stix or Similar Pattern on Clear

for Design Center, 1/2 Sq. Ft.

Pattern Dichroic on Clear for Bra Accent, Scrap

Border Firestrips on Black for Decorations, 12" Lengths (2)

Assorted Wavy Firestrips on Black

for Decorations, 6" to 14" Lengths

Rainbow Noodles for Decorations, 2" to 12" Lengths

### Tools and Materials

1/8"-Thick Fiber Paper for Slumping and Rose Buds, 1 Sq. Ft.

1/2"-Thick Fiber Blanket for Slumping, 1/2 Sq. Ft.

Kiln Scissors Glue Stick Pencil

Tapered Ceramic Sconce Slumping Mold

X-Acto® Knife E6000 Adhesive

1

*Carefully load the ceramic shelf and assembled project in the kiln and fuse the glass.*



Fire the project to a full-fuse temperature using the guide at the end of the tutorial. Now comes the fun part!

This elaborate corset shape is the result of slumping the fused glass several times. It's done gradually in stages to ensure that we maintain control of the finished shape.

2

*Using the paper pattern as a guide, cut the shape of the bra portion of the corset out of 1/8"-thick fiber paper.*



Place the cut fiber paper under the fused corset and fire it on the kiln shelf to a slump temperature using the guide at the end of the tutorial.

3

*Slump the bra pieces a second time.*



Cut larger bra pieces out of 1/2"-thick fiber blanket, again using the paper pattern as a guide. Tuck the fiber blanket under the glass and slump it a second time. Shown here is how the project looks before placing the glass over the fiber paper, before the second slumping, and after the second slumping.

4

*Compare this side view of the glass before the second slump to your own piece.*



5

*Compare this side view of the glass after the second slump to your own piece.*



## Creating the Elegant Curve

Carefully lift the slumped corset off the shelf. The fiber blanket may stick to the back of the glass. That's okay. If it doesn't stick, take the fiber blanket off the shelf and lay it in the appropriate place on the ceramic slumping mold.

6

*Lay the cut fiber paper and fiber blanket on the ceramic slumping mold and place the glass on top of the fiber material.*



Make sure that the fiber materials line up with the bra portion of the corset.

7



*Slump the glass using the firing guide at the end of the tutorial.*



8



*Grind the bottom edge of the corset to flatten the edge so that the glass stands safely on its own.*



## Making the Base

Cut a piece of 1/4"-thick clear glass to size. Cut two 1/4" clear glass rods to fit. Fire the three pieces separately on the shelf to the slump temperature to polish the cut edges.

9

*Use E6000 glue to attach risers onto the clear base, then glue the corset to the base.*



Glue the clear rods onto the clear base with E6000. Let the base dry overnight. Glue the corset to the base with E6000 and, once again, let the glue dry overnight.

This fashionably chic garment can be as simple or as elaborate as your imagination desires. The real thrill is in the spontaneous design process. Trust your artistic instincts and you're sure to create a stylish, sculptural work of art. Happy Fusing!

**GPQ**



## Firing Schedules

NOTE: All kilns fire differently. Test-fire these guides in your own kiln and make adjustments as needed.

### Fusing Guide

Segment 1: Ramp 300°F/hr to 1300°F and hold 30 min.

Segment 2: Ramp 500°F/hr to 1465°F and hold 10 min.

Segment 3: Ramp 9999 (AFAP\*) to 960°F and hold 40 min.

Segment 4: Cool to room temperature.

\*as fast as possible

### Slumping Guide

Segment 1: Ramp 300°F/hr to 1265°F and hold 10 min.

Segment 2: Ramp 9999 (AFAP\*) to 960°F and hold 40 min.

Segment 3: Cool to room temperature.

\*as fast as possible



*Lisa Vogt discovered glass while pursuing an education in fine art. For more than thirty-five years, this award-winning artist has drawn upon her fine arts background and own sense of style, drama, and whimsy to combine this historic medium with innovative glass techniques for limitless design possibilities. Her work has been on exhibit in major cities throughout the United States.*

*Lisa is the author of fourteen design books and a series of instructional videos in addition to frequent articles for industry magazines and fiction for publication. She also lectures at national and regional seminars and has been a featured artist on HGTV, PBS, and Glass Patterns Quarterly Webinars. A huge supporter of public art, Lisa regularly contributes artwork for auction to benefit local, regional, and national charities. Her home and studio are located north of Tampa Bay in Wesley Chapel, Florida, where she resides with her husband and two daughters. Visit [www.LisaVogt.net](http://www.LisaVogt.net) to find out more about her work and seminars.*

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## Kiln Corner

# Simple Thermocouple Repairs Correcting Inaccurate Controllers on a Digital Kiln

by Arnold Howard

*In the Winter 2019 issue of Glass Patterns Quarterly™, we looked at some of the basics of thermocouple repair. In this installment, we'll review some additional considerations when checking for necessary repairs.*

If you recall from the last Kiln Corner, the thermocouple reads the kiln temperature. When the controller on a digital kiln becomes inaccurate, the problem is often a minor thermocouple error that is easy to repair. **Before following the advice in this article, be sure to disconnect the power to your kiln first.**

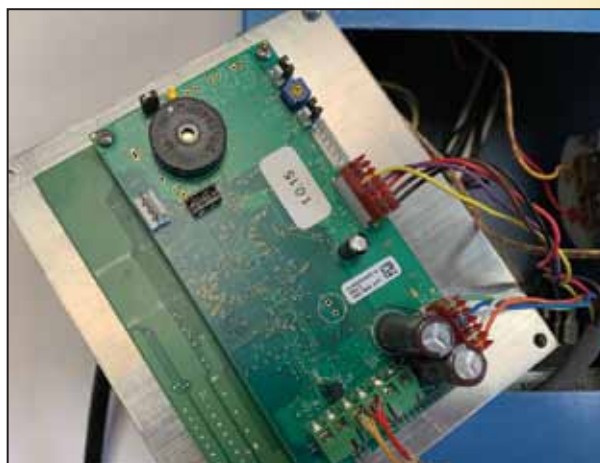
Sheet metal in the kiln control panel can expand and move as the kiln gets hot, and in some cases this can ground the thermocouple against the steel case. This happened recently with a 3-zone kiln. In Photo 1, the panel where the thermocouples were mounted moved upward, causing a thermocouple to touch an upper steel cover. When the thermocouple touches the steel case, the temperature reading will be lower than the actual temperature in the kiln. That is because the thermocouple produces an electric signal. Some of the signal drains out into the steel case of the kiln on contact, producing a weaker signal.

In another kiln, the thermocouple wires that were attached to the back of the controller shorted out against the case, lowering the temperature reading. See the thermocouple connection block in Photo 2. When you install a thermocouple, check the space around the thermocouple wires to make sure they cannot touch anything else.

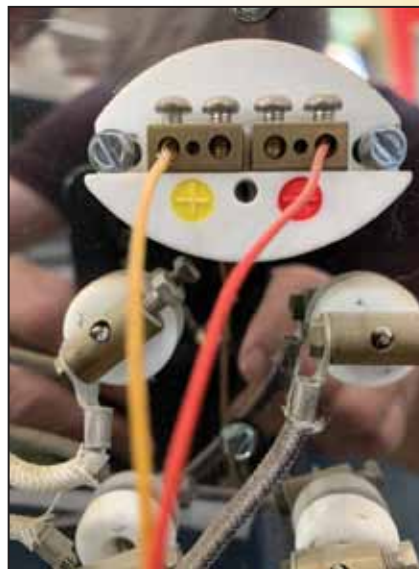


(Photo 1) The thermocouples are mounted in the top of a kiln. The steel they were mounted on moved upward and caused a thermocouple to touch the top panel (removed for the photo). This threw off the temperature reading.

(Photo 2) This is the oval thermocouple connection block. The yellow and red wires go to the controller. If the four center screws, brass connection blocks, or thermocouple touch the kiln case, the temperature will lose accuracy.



(Photo 3) The yellow and red thermocouple wires are at the bottom of the controller in this photo. You should find a red mark on the controller where the red wire goes.



(Photo 4) The yellow and red thermocouple wires must be attached to the correct oval connection block screws. Notice how the block is color-coded.



(Photo 5) Before closing the switch box on a kiln, move the thermocouple wires away from other wires as shown here.



Shelves, posts, molds, or kiln dams that are less than 1/2" from a thermocouple can alter the temperature reading. In an experiment, I drilled two thermocouple holes in a small kiln and inserted two test thermocouples. I placed posts 1/8" away from a test thermocouple and 3/4" away from the other one. The thermocouple that had posts 1/8" away registered readings that were 8°F to 16°F hotter than the thermocouple that had posts 3/4" away. That is because heat radiated from the posts.

Remove the controller, which is usually held by four corner screws. Look at the back of the circuit board where the thermocouple wires are attached. (Photo 3) Are the colored wires attached to the correct color-coded terminals? Ordinarily, putting the wires on the wrong terminals will cause the temperature reading to go down when the actual temperature goes up.

If the wires are on the wrong terminals and yet the kiln seems to fire normally, then the wires are also attached to the wrong terminals at the thermocouple connection block. (Photo 4) This will introduce an inaccuracy of about 150°F. Reattach the wires to the correct terminals.

Make sure the thermocouple-to-controller wires are away from other wires in the switch box. Relay-to-element wires that are too close to the thermocouple wires will reduce the accuracy of the temperature readings. In Photo 5, I moved the thermocouple wire away from the other wires before closing the switch box.

GPQ

Since 1977 when Arnold Howard began working at Paragon Industries, he has seen kilns evolve from switches to touch screen displays. He helped test the early glass kilns and wrote Paragon instruction manuals, newsletters, and advertisements.



Arnold has taught kiln classes at trade shows, Bullseye Glass in Portland, and in Australia and England. In September 2019, he started Howard Kilns, a repair and preventive maintenance business, to serve the Dallas-San Antonio, Texas, area. Arnold works on all brands of kilns. Feel free to contact him at [arnoldhoward@gmail.com](mailto:arnoldhoward@gmail.com).

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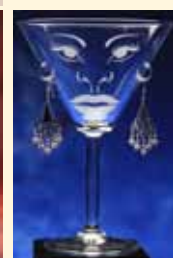
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# Tiny Spring Vase

*Design, Fabrication, and Text by Susan McGarry*



This adorable little vase is a great way to bring a bit of the spring indoors, but it can be used all year long. I've used dichroic glass, but it could be made with any style of glass. Once you have mastered the Tiny Vase you can attempt a larger version. I hope you enjoy this project as much as I do. Happy Fusing!

**Wissmach 90™**  
Matrix Textured Dichroic Glass, Scrap  
**Additional 90 COE Glass**  
Opaque White, Scrap  
**Tools and Materials**  
Kiln and Kiln Supplies  
1/8" Fiber Paper  
1 Magnet E6000 Adhesive  
Rotary Tool Tweezers

1

*Cut out the glass shapes.*



Cut the white glass into a triangle 2" across the top and 2-1/4" from the top to the bottom point. Cut the dichroic glass into a triangle 2-3/8" wide at the top and 2-3/8" from the top to the bottom point. The dichroic glass is cut slightly larger than the white glass to allow it to slump over the fiber paper.

2

*Cut out the fiber paper.*



Cut the piece of fiber paper into a smaller version of your triangle glass piece that is approximately 3/4" wide by 1-3/4" high. The fiber paper will be used to make the opening in the Tiny Spring Vase. In my example, I have used one piece of fiber paper for the opening. If you want a deeper opening, cut 2 pieces of fiber paper and stack them on top of each other.

3

*Fuse the glass.*



Load the kiln by placing the white piece of glass on a prepared kiln shelf. Place the fiber paper triangle on top of the white glass with a small amount of the fiber paper extended above the top of the white glass triangle. Place the dichroic glass on top of the fiber paper, lining up the top edge of the dichroic glass with the white glass.



Use the following schedule to fuse the Tiny Spring Vase. Remember that each kiln fires differently, so you may need to make adjustments to fit your own kiln.

Segment 1: Ramp 350°F/hr to 1200°F and hold 20 min.

Segment 2: Ramp 9999 (AFAP\*) to 1400°F and hold 20 min.

Segment 3: Off. Allow kiln to cool to room temperature before opening.

\*as fast as possible at bottom of schedule

4

Remove the fiber paper from the pendant.



Place the Tiny Vase in a tray of water to saturate the fiber paper. This is a safe way to keep the fiber from becoming airborne. Use tweezers to remove the fiber paper and dry the inside of the vase thoroughly.

5

Use the rotary tool to rough up a small area on the back of the vase where the magnet will be attached.



6

Place a small amount of E6000 on the back of the magnet.



7

Attach the magnet to the vase and press it down for at least 15 seconds.



Clean off any excess glue that has squeezed out around the edge of the magnet. After 24 hours place the Tiny Vase in a 275°F oven or kiln for 20 minutes. Allow it to cool completely before hanging the vase, then fill with your favorite flowers and enjoy! **GPQ**

*Susan McGarry has been passionate about glass since her first glass class and has exhibited her fused glass jewelry and artwork in shops throughout the United States and Ireland. She teaches through tutorials, books, webinars, live classes, and Facebook Live broadcasts.*



*The artist combines colors in a unique way to create one-of-a-kind designs and feels that working with glass is exciting and challenging, and that it taps into the imagination for creating something new. In 2012 she started her business, ArtiFill.com, manufacturing molds and jewelry findings for artist and crafters.*

*Susan was born and raised in southern California. Her home and glass studio are now north of the San Francisco Bay area. You can find Susan McGarry Glass at [www.facebook.com/SusanMcGarryGlass](https://www.facebook.com/SusanMcGarryGlass) as well as on Instagram.*



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# Joyful Ceiling Lamp

*Design, Demonstration, and Text by Petra Kaiser*



Once in a while we run into a spot where a low ceiling lamp is just right for the place in question, and what a difference a nice lamp can make. It is a real joy now, and every time I walk into the space, I look at the lamp with pride.

## **Wissmach 96™**

14" x 14" White for Lamp Shade Base  
Random Sizes, Shapes, and Colors  
for Design Elements, Scrap

### **Tools and Materials**

Kiln and Kiln Supplies  
Kaiser Lee Board Drape Triangles  
Permanent Marker Fusing Glue  
Papyros™ Kiln Paper  
10 mm Diamond Drill Bit  
Fiber Paper or Glass Fiber Cloth  
Lamp Fixture Waffle Grid  
Stainless Steel Ring Ruler

1

*Select the  
light fixture you  
will use for the  
lamp hardware*



Let's go shopping!  
If you are lucky enough to live in an area where you have easy access to one of those big box hardware stores, you will find that they have the least expensive light fixtures. I have searched everywhere to find just lamp fixtures, but nothing is less expensive





I look for lamps with just one hole in the glass. Those are the perfect fixtures for kiln formed glass shapes. Yes, they do come with a piece of glass, but we definitely can improve their design. All we are interested in for this project is the hardware.

2

*Check to see if there is a rubber ring in the purchased lamp that can be used later in your glass lamp.*



In this case we were lucky. The glass part had a rubber ring that we were able to remove and install in the hole of our glass lamp. This is an ideal buffer. Your glass lamp might also come with another way to avoid stress when screwing it in.

3

*Design your glass shade by selecting your lamp size, then cutting the base glass.*



In order to accommodate the two bulbs, you will need a nice size lamp. I decided on a 14" x 14" square. Here is the good news. You do not have to cut a circle, but we also won't be working with just a square. Here is a way to work with a square that will create a pretty, pleasing shape, at least in my view.

4

*Mark and cut the first round of triangles.*



The waffle grid comes in very handy for this type of design. For the first round of triangles, count 12 squares to the left and 3 squares down. Turn the glass counterclockwise and repeat in each corner.



5

*After you remove the first round of triangles, draw in a second round of triangles and cut them off as well.*



The second time around, go 6 squares to the left and 1 square down.

6

*Grind the glass edges to smooth.*



7

*Reinforce the center of the base glass and place the design elements on the base.*



Use a tiny piece of dark glass and secure it with some fusing glue to the center of the base glass. This will help you a lot once you have to drill the glass.

In the case of a lamp, I prefer to use a white base glass, since it does not interfere with the color of the transmitted light. It also shows off all of the decorative elements you choose.

Lately I have been experimenting with glass stretching. There is a PDF lesson for this in an e-book that is available on our website. The hardest part is to take the cutters or hammer to it and destroy a beautiful piece of art in order to get the design elements needed for the lamp. However, using those thin shards has the advantage that they do not add a lot of weight to the lamp.

8

*Place the glass on a piece of Papyrus kiln paper on an even kiln shelf and fire using the suggested schedule.*



The following is the firing schedule I used. Remember, however, that all kilns fire differently, so you may need to make adjustments to fit your own kiln.

Segment 1: 600°F/hr to 1000°F and hold 10 min.  
 Segment 2: 9999 (AFAP\*) to 1410°F and hold 10 min.  
 Segment 3: 9999 (AFAP\*) to 900°F and hold 45 min.  
 Segment 4: 100°/hr to 700°F and no hold.  
 \*as fast as possible

9

Set up some Kaiser Lee Drape Triangles around a stainless steel ring for draping the lamp shade.



13

Fill the lamp shade with a little bit of water to avoid stress while you are drilling.



10



Remove the ring and cover the setup with a glass fiber blanket.



The fiber blanket, like the Kaiser Lee Board, lasts for countless firings. However, you can also use a piece of fiber paper to prevent the lamp from slumping into the center. Use a ruler to make sure that you center the glass on the mold setup.

14

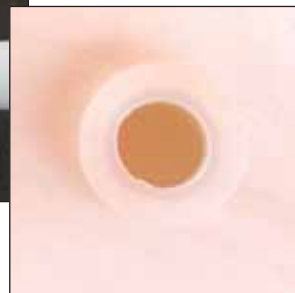
Use a 10 mm diamond core drill bit to drill the hole in the center of the lamp shade.



15



Install the lamp shade.



Drape-fire the glass using the suggested firing schedule, making any necessary adjustments for your own kiln.

11



Segment 1: 300°F/hr to 1000°F and hold 10 min.  
 Segment 2: 9999 (AFAP\*) to 1180°F and hold 10 min.  
 Segment 3: 9999 (AFAP\*) to 900°F and hold 45 min.  
 Segment 4: 100°F/hr to 700°F and no hold.  
 \*as fast as possible

Wissmach Glass fires very shiny and fuses at fairly low temperatures. It is a joy working with this glass. Our design elements have been fired four times and are still very bright.

12

Before drilling the center hole, place a small piece of glass under the lamp shade.



This will help the drill bit stay at the same speed once it is all the way through the shade.



With a little patience I was able to insert the rubber ring. Now the lamp is hanging beautifully in its new spot.

GPQ



Here is a short excerpt from my free firing e-book PDF *Kiln Glass Firing Suggestions* you can find at [www.Wissmach.com](http://www.Wissmach.com). The excerpt explains why we all should use 900°F to level the temperature of the glass.

• **The Annealing Point.** This is anywhere between the softening point and the Strain Point. Ted Sawyer concluded after an array of testing that it is much more efficient to move the annealing point closer to the Strain Point. It could actually be counter productive to hold glass for an extended time at higher temperatures. This is why we follow his suggestion and will change the annealing temperature to 900°F.

• **The Strain Point.** Corning assumes that for most glass types the range of strain points is around 840°F. Once you are past the strain point, the glass will not anneal any more. You still have to be cautious about thermal shock, however, so leave the kiln closed until it reaches room temperature.

*Petra Kaiser, internationally renowned kiln formed glass artist and instructor, has a distinctive style that captures Florida sun,*



*light, and water in sculptures, functional glassware, and wearable designs. She is always drawn to 3-D sculptures and abstract shapes, and when first introduced to glass fusing in 1997, she found the available mold options rather limiting. This gave birth to Kaiser Lee Board, a perfect kiln forming medium developed by Petra and husband Wolfgang, that is easy to cut and form into any shape for fusing molds.*

*Petra loves to teach and shares her cutting-edge techniques and designs with students in her Fuse It Studio and all over the world, and is a regular instructor at the Glass Craft & Bead Expo, BIG Arts, and Edison State College. She has also shared her innovative ideas in three books from Wardell Publications as well as through numerous articles in various international glass magazines. Visit [www.kaiserlee.com](http://www.kaiserlee.com) to learn more about Petra's glass art and workshops.*

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# Kiln Formed Powder Wafers

## A Quick and Easy Approach for Dynamic Design

*Design, Fabrication, and Text by Bob Leatherbarrow*

**W**afters are design elements made by heating thin layers of powder just to the onset of fusing directly on a kiln shelf. The elements can then be incorporated as tack fused or fully fused elements in kiln formed projects. They require no more than a few tablespoons of glass powder, and the firing cycle is amazingly short. Therefore, if they don't come out as expected, they can be discarded. A major benefit of this approach is that artists are encouraged to take risks. In this tutorial you will learn how to create a design from a stencil of a cave art horse and use blended powders and brushes to create painterly effects.

### 90 COE Powder

Black

White

Canary Yellow

Red

### Tools and Materials

Kiln Kiln Shelf Kiln Wash

Thin Film Stencil Fine Mesh Sifter

Fan-Shaped Artist Brush Paper Strips

Small Kiln Posts or Similar Weights

Respirator Mask Putty Knife

220-Grit Diamond Hand Pads or Grinder

## Creating the Wafer

1

*Place the stencil, upside down, directly on a kiln shelf.*



The side of the wafer adjacent to the kiln shelf will ultimately be the display side of the wafer. Since the wafer will be flipped over, the stencil, which is made from thin, flexible film, must be placed upside down on the shelf. For easy removal of the stencil later in the process, place masking tape tabs on the stencil in locations that are convenient for lifting.

Use small weights such as kiln posts to prevent the stencil from moving. If the stencil is not flat against the shelf, use small weights such as inverted flat screws to flatten the stencil.



2

*Create painterly dark highlights.*



Sift small patches of the black powder in areas around the mane, tail, shoulder, thigh, underbelly, and legs. **Note: Remember to always wear a respirator when working with glass powders to avoid any inhalation of the glass particles.**

3

*Lightly sweep the powder with the fan-shaped artist brush to define the musculature of the shoulder and thigh.*



This will also create shading along the legs, underbelly, and hooves.

4

*Sift the white powder over the mane, tail, and back of the horse to highlight and tint.*





In the mane and tail, the white powder will make the black stand out. On the back of the horse, the white will tint or soften subsequent colors.

5

*Apply the red and canary yellow powders for the sequence of predominant colors for the horse stencil.*



Sift bands of increasingly darker colored powders, starting from the top of the horse's back down to the legs and hooves. Dark colors bleed through the light colors when fired, so it is important to sift the lightest bands first. The result will be a blending of colors rather than sharp transitions.

The total thickness of powder should be about 1/16" (1.5 mm), and the edge of the stencil pattern should be barely visible. If the powder is too thick, the outline will blur when the stencil is removed.

6

*Remove the stencil.*



Place the edges of your hands on the kiln shelf and use the masking tape tabs to lift the stencil upward. Brush away any stray powder.

7

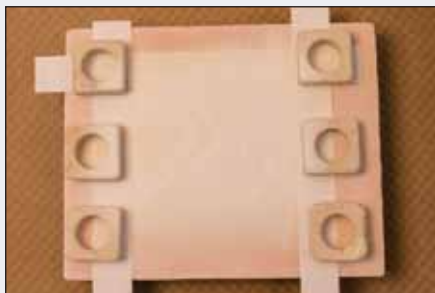
*Form the border for the background layer of powder.*



Place strips of paper to form the border for the background layer of powder. These strips, which can be cut from computer paper, are optional. In this case the design will have three straight borders and one feathered edge. Use small kiln posts to hold the borders in place.

8

*Sift a layer of the white powder over the stencil pattern and paper borders.*



Use a powder that is significantly lighter in color than the stencil pattern. If the powder is too dark, the stencil pattern will disappear when fired. In this example, some highlights of Canary Yellow were sifted onto the corners prior to applying the white powder. The thickness of the background layer should be about 1/16" (1.5 mm). The paper border should be barely visible.

9

*Remove the kiln posts and paper strips.*



10

*Fire the wafer.*



The following schedule works for most kilns. Fire at 600°F/hr to 1285°F (333°C/hr to 696°C) and hold for 10 minutes. Remember that each kiln fires differently, so you may have to vary the schedule slightly for your own kiln. Lightly rub the design (kiln shelf) side of the wafer after firing. If the powder rubs off, fire slightly hotter or longer in subsequent firings. With proper firing of the area, you should notice that the color of the powders will intensify, the stencil pattern will show through the background layer, and the edges will contract very slightly.

11

*Clean up the project.*

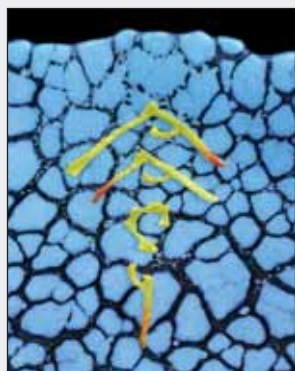


The viewing or design side of the wafer was against the kiln shelf and may have picked up a light layer of kiln wash. Dip the wafer in water and lightly rub with the flat side of a putty knife to remove any wash that is stuck onto the wafer.

Trim the edges of the wafer as desired with a 220-grit diamond hand pad, grinder, flat lap, or wet sand paper wrapped around a block of wood.

## Designing with Wafers

The finished wafers can be used as a design element between layers of glass. They can also be fully fused or tack fused to the top surface. If you place wafers between layers of glass, place them at the edge to allow trapped air to escape and minimize bubbles. If they are fully fused to the top surface, apply a thin coat of overglaze such as Super Spray to the wafer to prevent devitrification.



Once you understand the simple process for making a basic wafer with a stencil, with some creativity the design possibilities are limitless. Consider firing the stencil design without the background layer of powder (omit steps 7 through 9 above and fire as in step 10) to get elements called “micro” wafers that can be tack fused onto projects.

The stencil design can be deleted and the background layer can be layers of various colored powders. These are referred to as “backed” wafers. Use micro and backed wafers together to add dimension to the surface of a project.

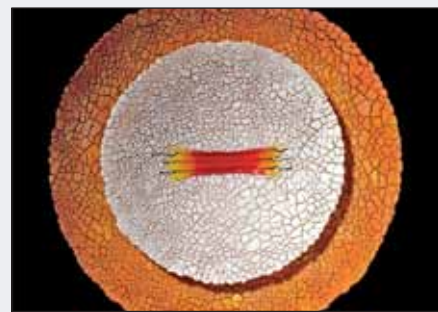


Gradations of colored powders can be fired directly onto the shelf, broken up after firing, and used as “color fields” between layers of glass.

Patterns can be embossed into the raw powder using linocut patterns, and the fired powder can be hand colored with powders, enamels, and/or micas to create “linocut monoprnts.”



When using the wafers as design elements, you can increase the top temperature when firing the wafers and allow surface tension to distort the powder into organic patterns.



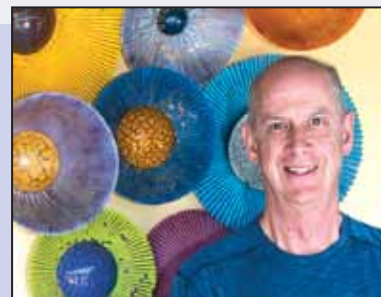
The fire polish that occurs when wafers that are tack fused to the surface of projects commonly obscures the subtle blending of powder colors. A light sandblast of the surface with 220-grit aluminum oxide will reveal the subtle colors. Mask off selected areas with masking tape or a coating of white craft glue that has been allowed to dry completely to further enhance the design. Sandblasting will commonly leave a dull matte finish. A subsequent firing to about 1150°F (621°C) or a light coat of a sealant such as Liquid Lust’er will return the depth and richness of the powder colors.

The minimal powder needs, cheap tools, rapid firing schedule, and the creation of wafers initially independent of sheet glass are all factors that encourage artists to experiment with wafers, take risks, and expand their toolbox of design techniques. Every time I think I have figured out wafers, something happens that takes me off in a new direction.

**GPO**

*More information on wafers plus creating crackle and related textures using kiln formed glass powders is available in Introduction to Kilnformed Glass Powders: Basic Crackle Texture, Micro and Backed Wafers, and Intermediate Kilnformed Glass Powders: Pebble, Oriented, and Colour-Filled-Veins Textures available as e-books through [www.leatherbarrowglass.com](http://www.leatherbarrowglass.com).*

*Bob Leatherbarrow established Leatherbarrow Glass Studio in Calgary, Alberta, Canada, in 1988 and has created original kiln formed glass ever since. Known for his innovative styles, techniques, and designs,*



*he has taken an experimental approach to developing unique textures and color palettes using glass powders. His glass bowls and sculptures explore the subtle hues and delicate beauty of naturally occurring textures and encourage the viewer to ponder their origin.*

*In 2008 Leatherbarrow moved his studio to Salt Spring Island, British Columbia, where he continues to make glass and write e-books on his signature techniques. He has also been a popular instructor on both the national and international kiln formed glass scenes. Visit [www.leatherbarrowglass.com](http://www.leatherbarrowglass.com) to learn more about his work.*

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# Fusing Levels Sample Set

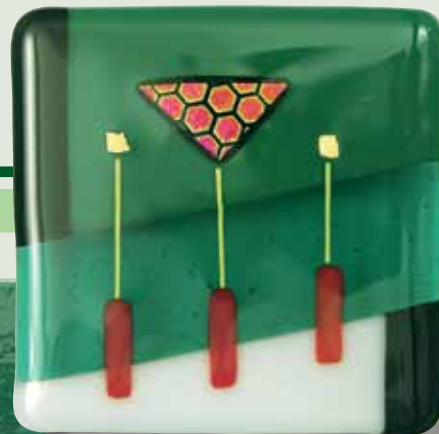
## How Fused Do You Want It?

by Randy Wardell

From an artistic point of view, the final fuse point (temperature + soak time) is a fundamental consideration. The choice you make here will determine if your piece is completely fused with rounded corners and a smooth, flat surface or if it will have minimally fire-polished edges with well-defined corners and an abundance of surface texture.

There are numerous stages in between those fusing extremes, but to keep things simple I've settled on six distinct levels and developed a firing schedule for each one. Then I designed and created a set of six tiles that use the same pattern and the same glass. In fact, I created two sets of tiles—one using COE 96 and one using COE 90 glass.

Next I placed one tile from each COE in my kiln and fired both of them at the same time using the same firing schedule. The only thing that changes from one schedule to the next is the final fuse point. As you will see, the results are really quite dramatic. I consult these sample tiles all the time when I'm trying to decide how fused I want my piece to be.



*These tiles were cut from the same glass. The left one was fired to 1245°F while the right one was fired to 1425°F.*

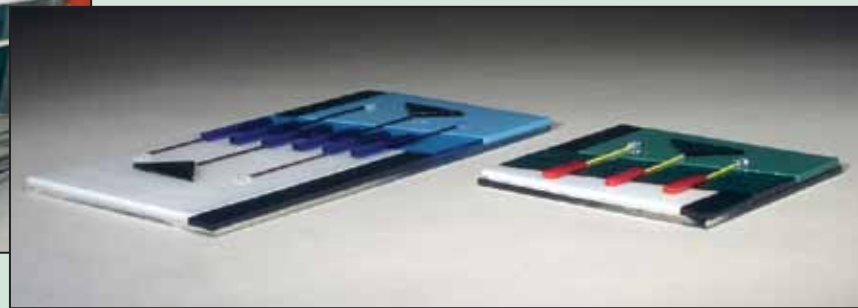
### I Know, I Know—All Kilns Are Different

Every fusing instructor I've talked to and every fusing book I've read tells us that all kilns are different and the appropriate temperature for any given result will vary. They recommend that you test your kiln to find the best fuse-level temperatures. They are right of course. Kilns do vary, but the question is what's the best way to test a kiln. My answer is by creating a set of tiles that are precisely the same, then firing them using six progressively hotter firing schedules that will produce tiles from barely tacked to fully fused.

I have no doubt that an FS4 Contour Fuse firing in your kiln will look somewhat different from the FS4 sample that I created in my kiln. That's okay, because what you need to know is exactly what a piece looks like when it has been fired in your own kiln using the FS4 schedule.



*These two kilns may look the same, but testing is still a good idea.*



*Both of these tiles were fired to an FS1 Elevated Tack schedule with a target temperature of 1245°F and a hold-soak of 10 minutes. COE 96 is on the left and COE 90 is on the right.*

**Pro Tip: When You Want Even More Control.** After you have created your six studio samples, you may want to refine the look of your piece to be a little more fused than an FS2 and little less fused than an FS3. Simply adjust the final target temperature slightly to a midpoint temperature—but be careful. “Slightly” is a relative term. If you do make this adjustment, remember to make a notation in your project log so you can use it again if you liked the outcome—or remember to stay away from it if you didn't.



**Pro Tip: COE Knowledge.** Here's all you need to know. When glass is heated it expands, and when it cools it contracts. However, not all glass does this by the same amount or at the same rate throughout the fuse firing schedule. The COE number identifies the glass varieties that will play well together. Keep them separated to maintain a cooperative and harmonious fusing environment.

## Temperature Differences Between COE Categories

As we've already discussed, the two most popular fusible glass categories are COE 90 and COE 96. You cannot mix glass from these two categories in the same project. However, you *can* fire different projects from each COE in the same kiln load, and that is exactly what I did for my sample panels.

The prevailing view within the fusing community suggests that COE 96 glass tends to soften sooner and at a lower temperature than COE 90 glass. In theory, that should mean that COE 90 glass requires a few degrees more heat and/or a few minutes longer soak to reach the same result. After close inspection of my finished sample panels I can see some tendency in that direction, but from a practical standpoint the differences are negligible. The point is that there is really no need to compare the outcome of one COE glass to the other. All that matters is to know exactly what a finished piece looks like when it has been fired using a particular schedule. Then you can make an informed choice the next time you need to know how fused you want it."

## Designs for the Studio Sample Tiles

Here are the designs that I created for my two-layer sample tiles. I wanted to have a single-piece clear base with a mix of opals and cathedrals on the second layer—from white to black and in between. For the decor layer, I wanted some geometric shapes, some large and small dichroic accents, and some stringers. Feel free to create a design of your own, or if you would like to use this design you can download the full-size pattern for free from the website, [www.JoyOfFusing.com](http://www.JoyOfFusing.com)

## Cut, Clean, and Assemble

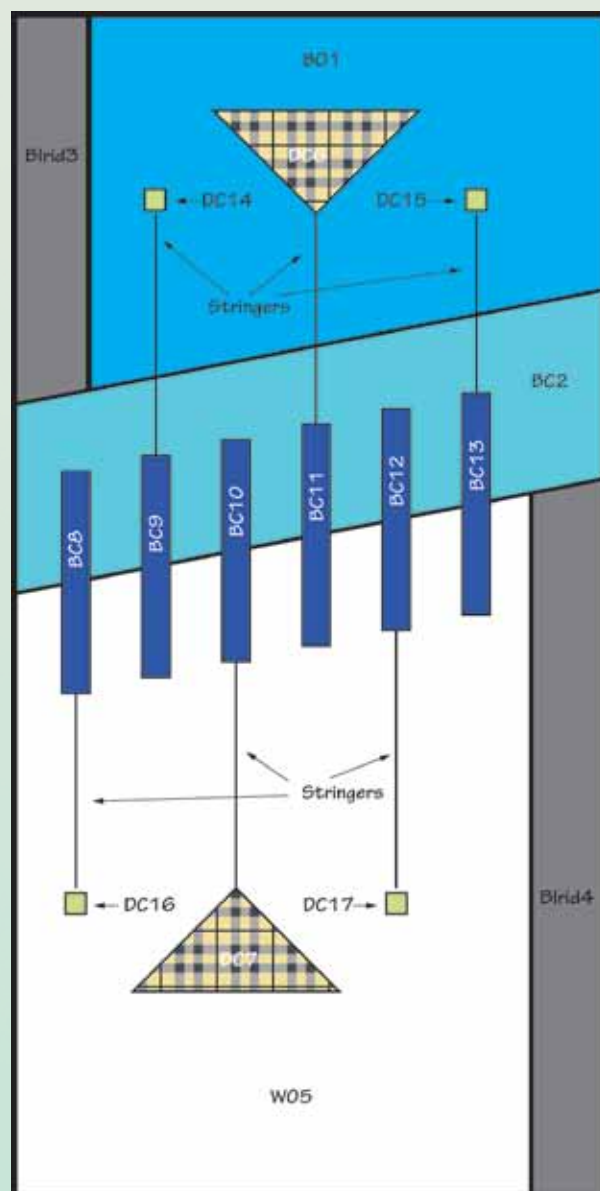
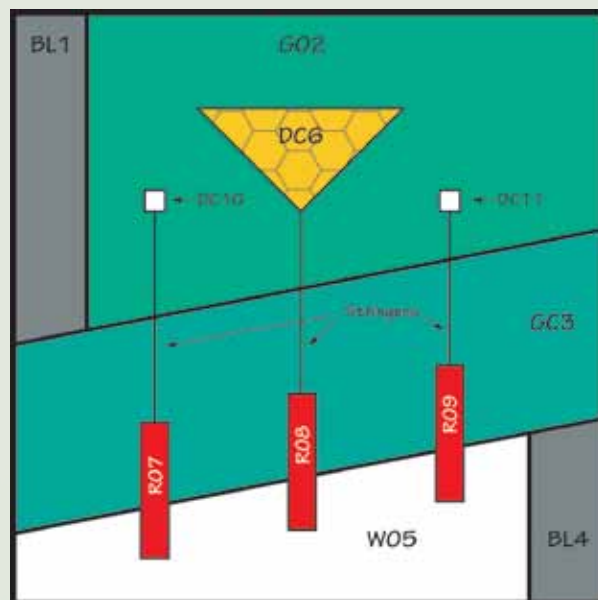
I selected my glass and cut all of my panels at the same time to ensure that all the glass was exactly the same. It's also faster to do it that way. I decided to make the larger panel using COE 96 and the smaller one using COE 90. It really doesn't matter, though, if you want to make all of your samples using only the larger or the smaller design. What really does matter is that you *must* keep the COE 90 glass separated from the COE 96! Go ahead and assemble your first sample set on a prepared kiln shelf.

## Fire the Sample Panels

The largest single piece in my sample tile is 4" x 8". That's an area of 32 square inches. The Ramp Rate Chart in the book *Joy of Fusing* suggests the Med-Small ramp up of 600°F per hour. I will fire one set of panels following each of the six firing schedules. The only difference in these firing schedules is the Final Target Temperature, with each one increasing from 40°F to 55°F for each new firing. You will find more on that in the "Conclusion" and "What If Your Elevated Tack Doesn't Look Like Ours?" sections of this article.

## When You're Ready, Just Do It

Place the assembled sample panels in the kiln, program the digital controller for Fusing Schedule 1 (FS1), close the lid, and hit the switch. Each of the following firing schedules includes five segments: Primary Heat & Bubble Soak, Intention Heat & Target Soak, Rapid Drop to Anneal Soak, Slow Descent Anneal Cool, and Power-Off Cool to Room Temperature.



## FS1 – Elevated Tack

All of the glass components are firmly stuck together and the surface is fire polished, but the edges are only slightly blunted. The stringers, the dichroic triangles, and other elements are elevated and retain an undistorted shape that produces a sculptural appearance.

### FS1 – Elevated Tack Schedule

Segment 1: Ramp 600°F/hr to 1150°F and hold 30 min.

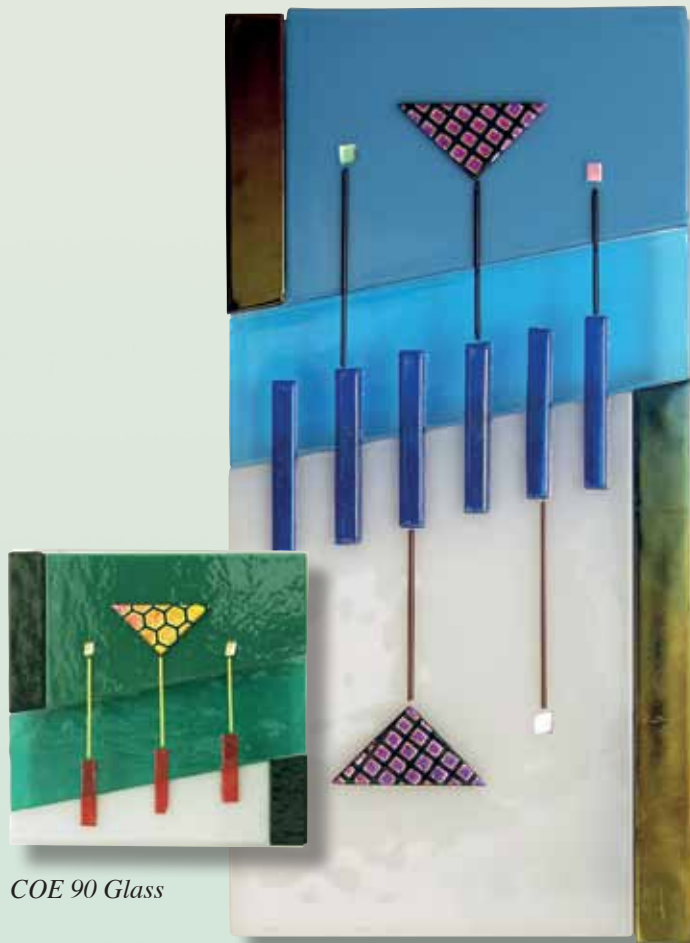
Segment 2: Ramp 300°F/hr to 1245°F and hold 10 min.

Segment 3: Ramp 9999 (AFAP\*) to 950°F and hold 45 min.

Segment 4: Ramp 125°F/hr to 700°F and no hold.

Segment 5: Kiln Power Off to 75°F (room temp). Do not open the kiln.

\*as fast as possible



COE 90 Glass

COE 96 Glass

## FS2 – Dimensional Tack

The outside edges are rounding slightly, and the surface is fully fire polished. The stringers are beginning to melt into the surface glass but are still raised with a pronounced texture. The space between adjoining pieces on the second layer have opened up slightly to form an attractive channel.

### FS2 – Dimensional Tack Schedule

Segment 1: Ramp 600°F/hr to 1150°F and hold 30 min.

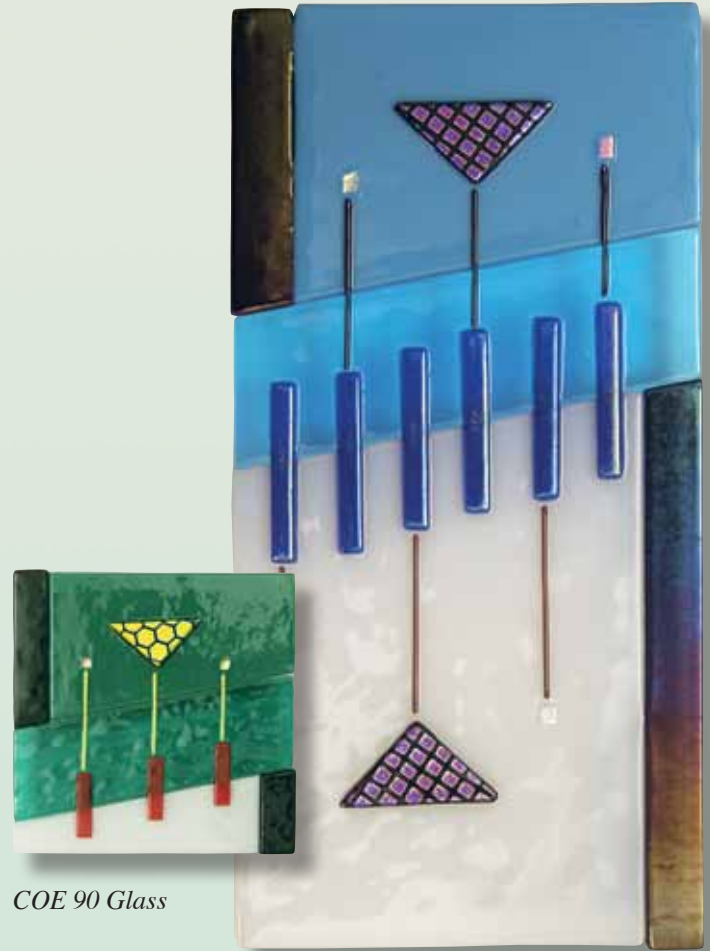
Segment 2: Ramp 300°F/hr to 1290°F and hold 10 min.

Segment 3: Ramp 9999 (AFAP\*) to 950°F and hold 45 min.

Segment 4: Ramp 125°F/hr to 700°F and no hold.

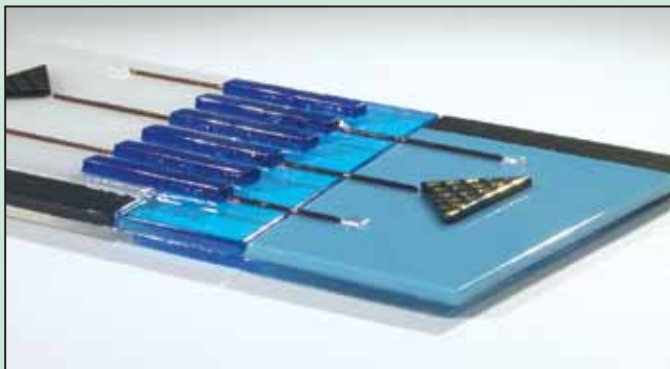
Segment 5: Kiln Power Off to 75°F (room temp). Do not open the kiln.

\*as fast as possible



COE 90 Glass

COE 96 Glass



The edges are crisp and the decor pieces are fully elevated.



The edges are blunting, but the decor texture is still very strong.

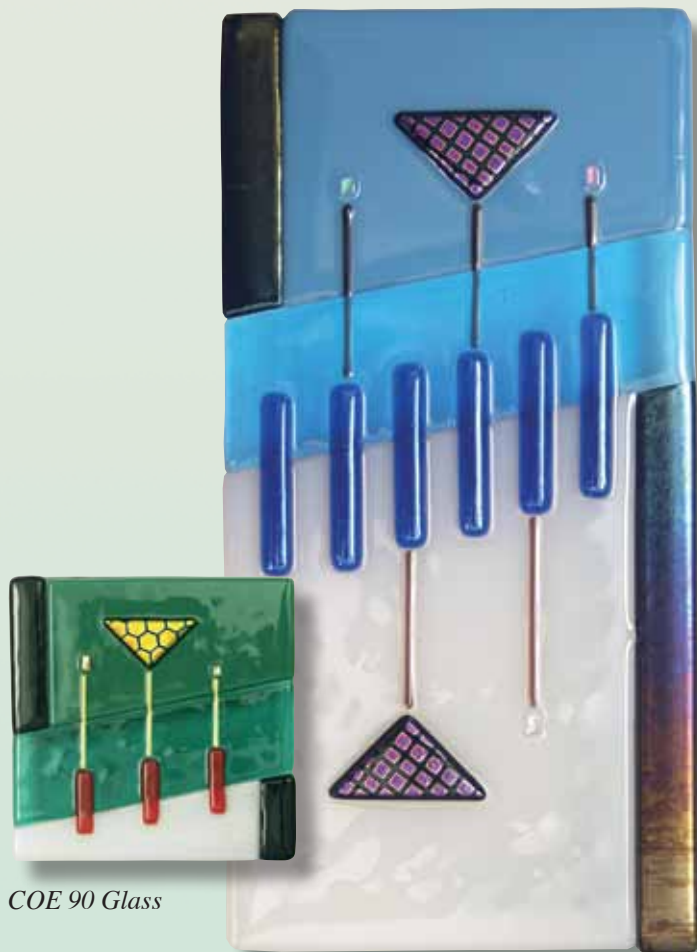


### FS3 – Texture Fuse

The surface decoration layer retains a pronounced raised texture that is about 50 percent of the original glass thickness. The edges and corners are rounding off, and the spaces are beginning to fill in. This is a perfect level for any piece where the surface texture is important to the design.

#### FS3 – Texture Fuse Schedule

Segment 1: Ramp 600°F/hr to 1150°F and hold 30 min.  
Segment 2: Ramp 300°F/hr to 1330°F and hold 10 min.  
Segment 3: Ramp 9999 (AFAP\*) to 950°F and hold 45 min.  
Segment 4: Ramp 125°F/hr to 700°F and no hold.  
Segment 5: Kiln Power Off to 75°F (room temp). Do not open kiln.  
\*as fast as possible



COE 96 Glass



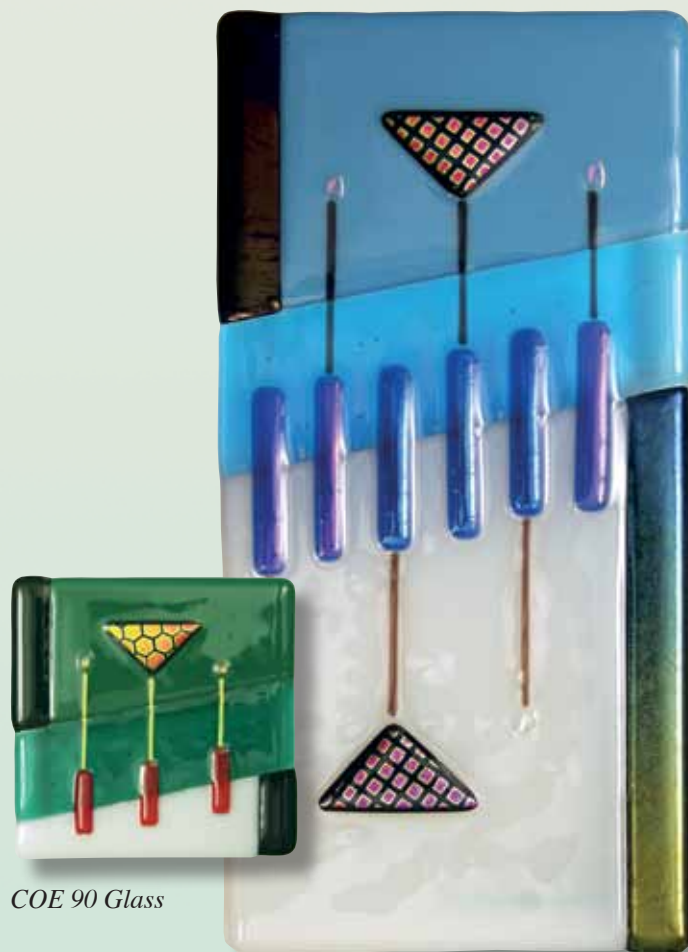
The decor layer glass is about 50 percent of its original thickness.

### FS4 – Contour Fuse

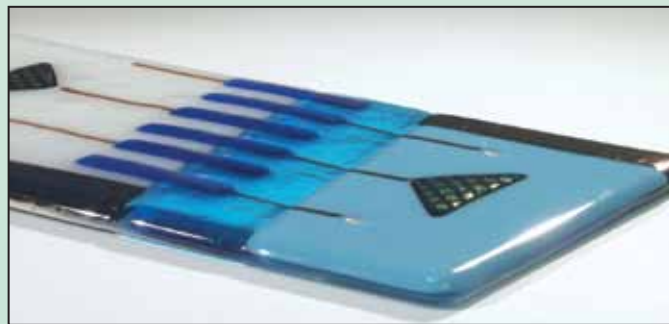
This tile is about 80 percent of the way to a full-fuse. The edges and corners are almost fully rounded off, but the top surface still has a lot of texture. This is a very popular fusing level, because the viewer can see and feel the texture from the decor pieces while presenting a fully fused effect.

#### FS4 – Contour Fuse Schedule

Segment 1: Ramp 600°F/hr to 1150°F and hold 30 min.  
Segment 2: Ramp 300°F/hr to 1370°F and hold 10 min.  
Segment 3: Ramp 9999 (AFAP\*) to 950°F and hold 45 min.  
Segment 4: Ramp 125°F/hr to 700°F and no hold.  
Segment 5: Kiln Power Off to 75°F (room temp). Do not open kiln.  
\*as fast as possible



COE 96 Glass



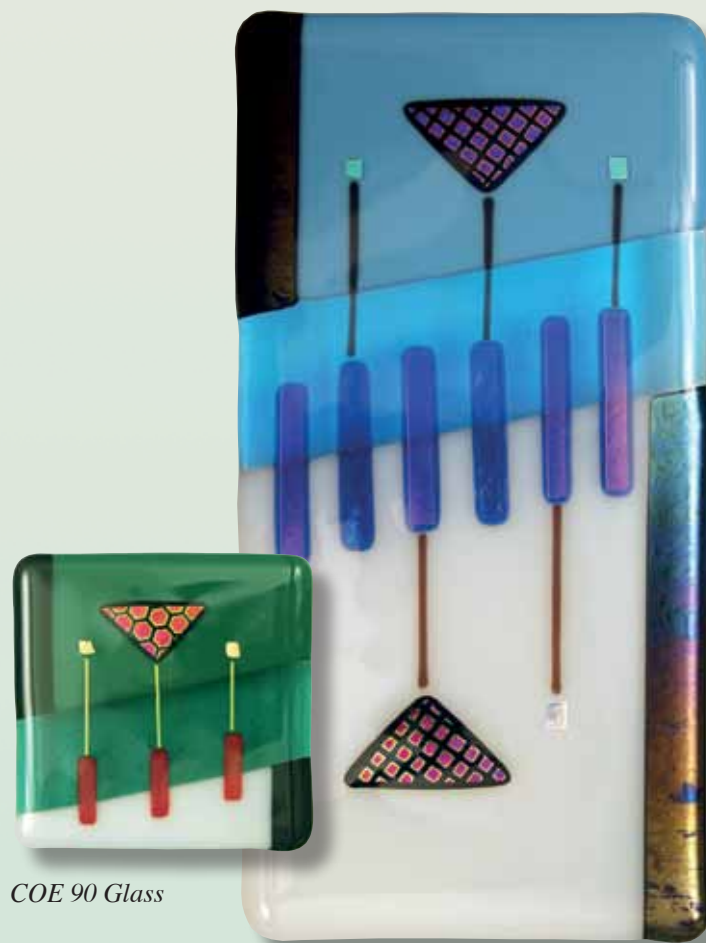
The edges have rounded, but there is still lots of surface texture.

## FS5 – Full Fuse

The surface of this tile is 97 percent flat, and only the dichroic-on-black triangles are ever so slightly raised. The corners and edges are completely rounded off, and the surface is slick and shiny. This panel was two full layers plus the design layer, so the edges on the square shape remain relatively straight.

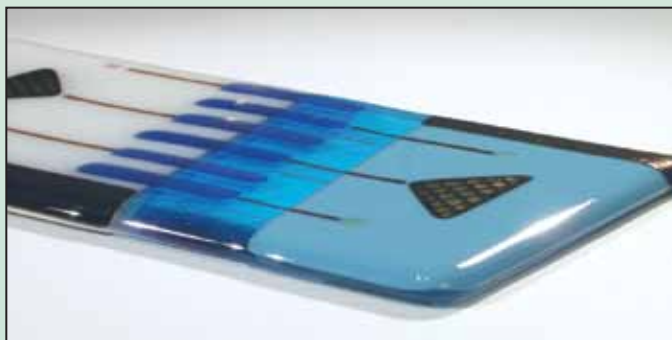
### FS5 – Full Fuse Schedule

Segment 1: Ramp 600°F/hr to 1150°F and hold 30 min.  
Segment 2: Ramp 300°F/hr to 1425°F and hold 10 min.  
Segment 3: Ramp 9999 (AFAP\*) to 950°F and hold 45 min.  
Segment 4: Ramp 125°F/hr to 700°F and no hold.  
Segment 5: Kiln Power Off to 75°F (room temp). Do not open kiln.  
\*as fast as possible



COE 90 Glass

COE 96 Glass



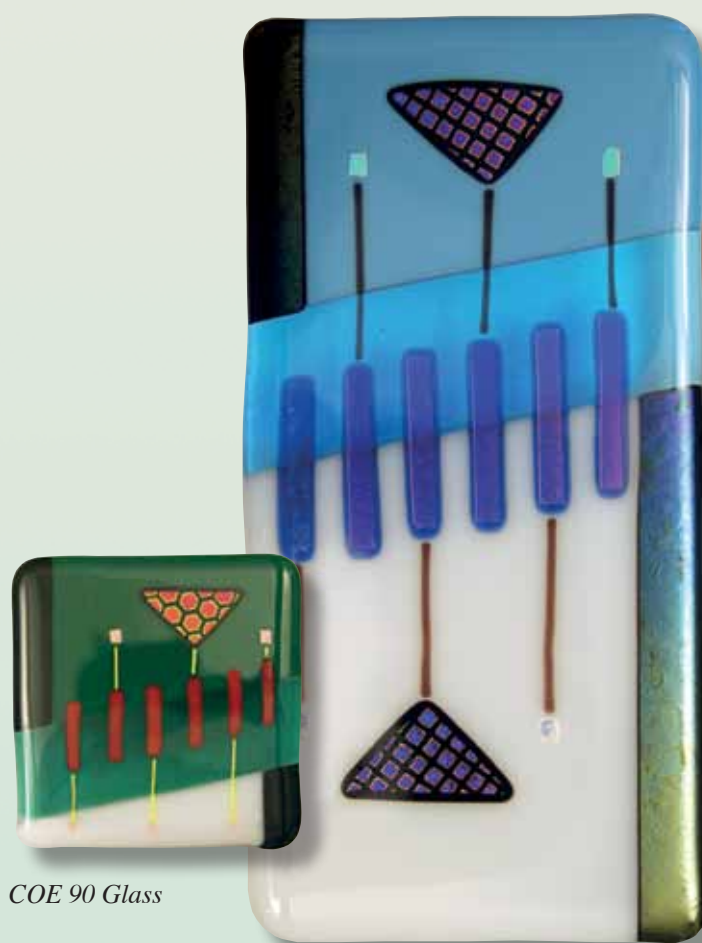
The tile is 97 percent flat, and the dichroic-on-black is raised only slightly.

## FS6 – Deep Fuse

The surface of this tile is 100 percent flat. The only difference between this firing and the previous FS5 – Full Fuse firing is that the dichroic-on-black triangles are now completely flat. The thickness is the same and there is a slight bump on the left edge, but the overall effect is more or less the same.

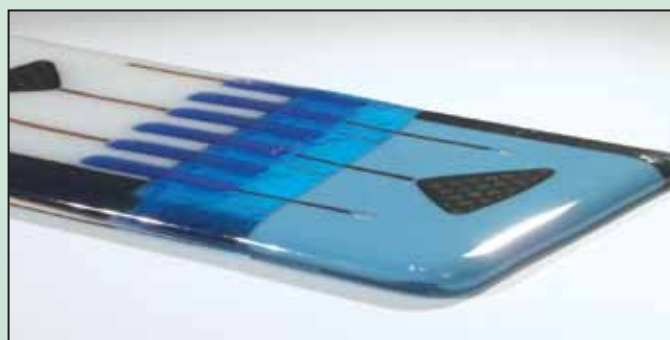
### FS6 – Deep Fuse Schedule

Segment 1: Ramp 600°F/hr to 1150°F and hold 30 min.  
Segment 2: Ramp 300°F/hr to 1470°F and hold 10 min.  
Segment 3: Ramp 9999 (AFAP\*) to 950°F and hold 45 min.  
Segment 4: Ramp 125°F/hr to 700°F and no hold.  
Segment 5: Kiln Power Off to 75°F (room temp). Do not open kiln.  
\*as fast as possible



COE 90 Glass

COE 96 Glass



The tile is 100 percent flat with a smooth surface and rounded edges.



## The Conclusion—What Did We Learn?

For me, the most surprising result is the rather subtle difference between any two adjacent tiles in the series. There is an observable difference, but the divergence is not as much as you might think. However, the difference between the first, third, and fifth tiles is quite dramatic. The reason I recommend six final fuse points is to make an allowance for the diversity between kilns and to take the variation between glass colors, glass types, and glass manufacturing processes into account.

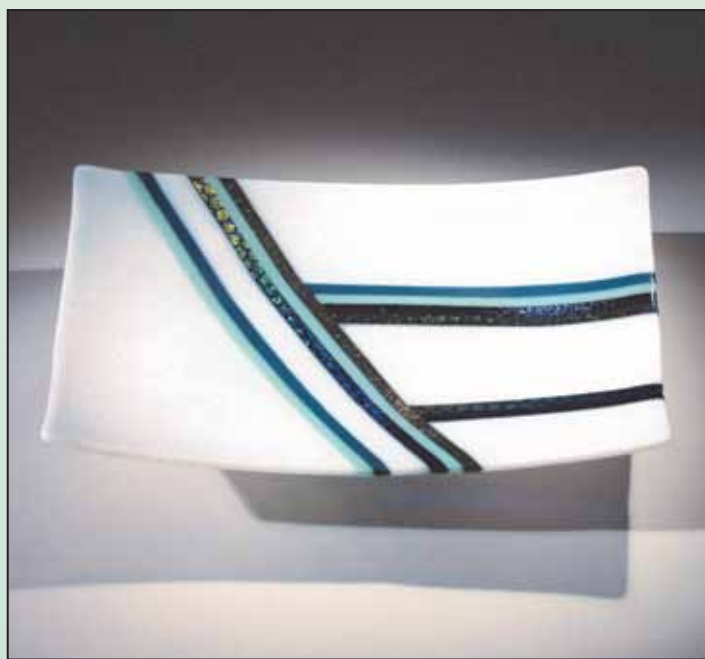
## What If Your Contour Fuse Doesn't Look Like Ours?

It would be nice if everything in life were entirely predictable. (Actually, that would be a little boring.) The fact is pyrometers are calibrated differently, and different kilns heat and cool differently. The perfect fuse point for a Contour Fuse in my kiln is 1370°F with a 10 minute soak, and from my experience there is a good chance that schedule will produce a slightly different result in your kiln. That is why I recommend starting your Fusing Level Sample Set using the FS4 firing schedule.

After you have fired that first tile, carefully compare your fired piece with the sample set of images in this article to make a determination where your piece fits best. If yours looks more like the FS3 Texture Fuse image, that means your kiln fires 40°F cooler than mine. That's the difference between the Intention temperatures of an FS4 Contour Fuse and an FS3 Texture fuse, so you would need to adjust the FS4 schedule in your kiln to be +40 hotter the next time you fire. It could be that your tile is somewhere between an FS4 Contour Fuse and an FS3 Texture Fuse. If that is the case, then the adjustment might be more like +20°F.



*This sculptural plate was fired to the FS1 Elevated Tack Fuse level.*



*This plate was fired with the design side down using the FS5 Full Fuse level.*

Make an educated guess for the best adjustment, then fire the next tile in your sample set using the FS2 Elevated Tack but make the adjustment that you just determined by increasing (or decreasing) the Intention temperature to compensate for the difference between your kiln and the one suggested in the firing schedule. If this adjusted FS2 Elevated Tack tile matches the image of the Elevated Tack, that means you have found the sweet spot and you need to adjust all of the Intention temperatures in all six schedules and fire the rest of the sample tiles using those new schedules. That will be the “Master Schedules” that you should always use for that kiln. **GPQ**

*Randy Wardell has been in the art glass industry for more than thirty-five years and has done it all, from teaching to retail supplies and a custom glass studio all the way to managing a major glass wholesale warehouse. In 1983 he founded Wardell Publications Inc to produce instruction and pattern books for the glass craft industry. Randy is the author of twelve books, and his company has created and released more than fifty published products into the market. He is a writer, editor, teacher, and frequent contributor to art glass magazines and informational websites.*

# Wild West Coast Waves

*Design, Fabrication, and Text by Michelle Frost*



Living on the West Coast, I have a love of all things wavy and watery. In my glasswork, I play with color and textures. As a painter, however, I love fluid and spontaneous movement in my paint, especially when making waves. They need to have a life of their own, so I let the paint and canvas dictate the outcome. Always curious, I wondered if a similar approach could be used in fused glass, so I decided to try my traditional painting approach and see what happened.

These pieces lend themselves very well to framing and presentation as fine art. With that in mind, I began with a size of glass that allows for some matting space around it. That way when it is placed in its final frame, the piece has some room to breathe. Here's a tip. Working with enamels has its challenges, so I would recommend starting small to perfect the process before going larger.

For this project I used a 6" x 6" glass square. We will not be full-fusing this glass, so you can use clear float glass or fusible glass. I have tried both, and they work equally well. This example is 3 mm fusing glass, but I often work with 4 mm float when I can, simply because it reduces the overall project cost. Be sure to clean your glass well before you begin to add the colors.

## **Glass**

Float or Fusible Glass, 6" x 6"

## **Rogue Glass Enamels**

Jet Black

Pure White

Vivid Turquoise

Steel Gray

Rogue Medium

## **Tools and Materials**

Mixing Containers

Paper Towel

Paint Brush Water

Prepared Kiln Shelf



1

*Cut the glass square, gather the colors, and mix the enamel paints.*



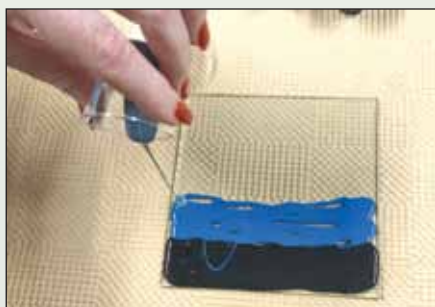
With the popularity of flow painting, most glass enamel manufacturers will have a recipe to mix their enamels for this technique. I am using Rogue/Dove enamels, because I like their flexibility to use across multiple firing temperatures.

The colors I am using are Jet Black, Pure White, Vivid Turquoise, and Steel Gray. Feel free to experiment with various colors of your choice—as a rule, no more than 3 or 4 colors. Use the darkest color on the bottom moving to white at the top. They are mixed with Rogue Medium to a consistency of heavy whipping cream.

I will mix about 1 to 1-1/2 total ounces of enamel per square of this size. White is the color I always use the most, because it is what forms the sky. If we are to break down the amounts, there would be 1/2 ounce of Pure White, 1/4 ounce of Jet Black, 1/2 ounce of Vivid Turquoise, and 1/4 ounce of Steel Gray. I always have a few extra glass squares cut in case I make too much color so that I can do another painting with the excess.

2

*Pour the enamels onto the glass square, beginning with the Jet Black.*



Before you begin to apply the colors, preheat your kiln to 180°F. Once the pour is complete, pop it into the kiln to dry the enamels in order to reduce the continual movement. You will also want to make sure that your studio space is at room temperature, since cool conditions will impede the dry time of the enamels. I also like to work on warm glass, so I make sure that it is at least room temperature as well.

The goal of the pour is to create a thin coat of color over the glass. If you have too much enamel, the color will move before it dries, and the definition of the wave you create will be lost.

Begin with the black bottom color. This is not a traditional pour with lots of volume that will move and pour off the sides. Instead, think thin and tidy. As you pour a thin strip of Jet Black across the bottom of the glass, it will begin to spread out. Next, pour a strip of the Vivid Turquoise, then the Steel Grey. These three colors should make up the bottom 1/3 of the glass. For the top portion, pour the Pure White.

3

*Use a paint brush to fill in any gaps in the colors.*



Once all the colors are poured, you will have some gaps. Use a paint brush to move the enamels around to fill them in. You should have a nice, thin layer all over the glass. If it looks as if the excess will drip over the sides, feel free to use the brush to pull some of the enamel off of the glass.

4

*Begin to create the wave.*



Now for the fun part. This is where we create the wave. Get a piece of paper towel about the width of the glass. Let the paper towel kiss the top of the enamel and gently pull it across the bottom of the glass.

5

*Move the towel up toward the top of the glass.*



As you near the top, lift the towel up lightly and continue to swoop it in the opposite direction, which forms a really beautiful wave shape.

6

*Drag the paper towel in the opposite direction.*



Once you have the initial shape, drag the paper towel back in the opposite direction to form smaller rolling waves near the bottom of the glass.

7

*Tilt the glass and allow the enamels to flow in various directions.*



If you have the right amount of enamel, the movement will be very small and subtle. If the enamels move around a lot, then chances are you have applied too much paint.

8

*Use a brush to play a little bit with the colors and the movement until the piece looks just right to your eye.*



Once you are happy with the design, move the piece into your kiln and allow it to dry. This can take an hour or two, so be patient. You want the enamel to be completely dry before you fire.

Once the enamels are dry, check the back of the panel and clean off any excess enamel. Now place the panel on a prepared kiln shelf and fire.



I prefer the Rogue enamels, because they do not require any special firing schedule. I fire the project according to the schedule I would typically use without enamels. This particular enamel can be fired as low as 1000°F up to 1500°F, so it's perfect for float glass as well.

This example was fired to 1360°F—just enough to soften the edges. Just remember that all kilns fire differently, so you may need to make some adjustments for your own particular kiln.

### ***Suggested Firing Schedule***

Segment 1: Ramp 500°F/hr to 1000°F and hold 10 min.

Segment 2: Ramp 800°F/hr to 1360°F and hold 10 min.

Segment 3: Ramp 9999 (AFAP\*) to 960°F and hold 60 min.

Segment 4: Ramp 500°F/hr to 300°F and no hold.

\*as fast as possible

These glass paintings make wonderful framed art pieces. For the framing, I am a fan of the premade frames from Opus. They are nice and deep, and they give a pro finish to this humble piece of glass. To keep the project all glass, I cut a larger piece of white glass and use some clear silicone to mount it into the frame. Next, I silicone the glass panel to the Pure White—a super simple and cost-effective way to make a wow presentation. **GPO**



*The journey for island-born Michelle Frost has been one of contrasts. A small town girl leaves home to study art and architecture in the city, opens a gallery, and finds herself in the spotlight of the emerging art world, only to pivot to accounting in corporate and government life. It was the process of untangling grief that lead her, lovingly, back to her art and the work of her hands. Just as glass can shatter on the studio floor and be recast, Michelle returned to her small inlet-town on the West Coast of Canada to reflect, reinvent, watch the waves, and breathe in the forest, beach, and campfires.*

*Michelle's studio, Coastal Flow Glass Co., is where she, with a little support from her two fur babies, creates beautiful, enduring art forms and weaves her imagery into modern decor designs as a way to share her beloved West Coast with others. Visit [www.coastalflowglassco.com](http://www.coastalflowglassco.com) to find more of Michelle's art. You can also find her work at [www.facebook.com/coastalflowglassco](https://www.facebook.com/coastalflowglassco). To contact the artist, e-mail [hello@coastalflowglassco.com](mailto:hello@coastalflowglassco.com).*

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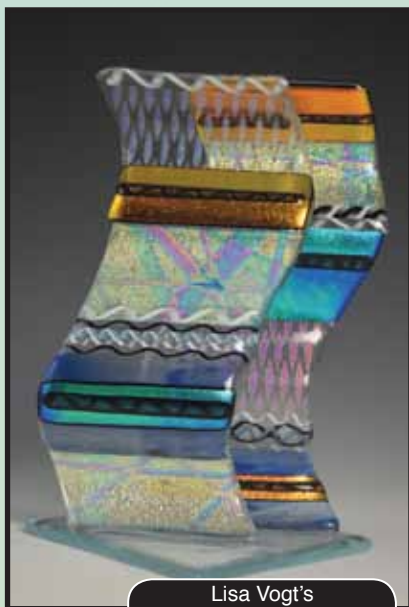
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## **INTRODUCING**

### **THE GLS17**

### **CLAMSHELL KILN**

The GLS has an interior dimension of 17 x 17 x 13.5 inches and a max temp of 1800 degrees Fahrenheit. The kiln includes a 15-inch square ceramic shelf and 4.5-inch posts. This kiln comes standard with the user-friendly Cress Digital Controller. Cress believes in long-lasting, dependable, and easy to use units. For that reason, the GLS17 comes standard with a built-in moveable stand and spring assisted lid plus elements mounted on the top side in quartz tubes for a greater number of firings!



- Quartz tubed elements mounted on an upper high-temp fiberboard!



- Easy to move lockable wheels for ease of positioning!

# Wissmach Luminescent Glass



Craig Mitchell Smith uses  
Wissmach Luminescent Glass  
for his new *Grace* series.

“Only Wissmach Glass can  
give me the soft, graceful curves  
I love. It drapes beautifully in  
the kiln, Wissmach is the  
perfect glass for me.”

*Craig Mitchell Smith, Grace*

Photography by Randy Blankenship



[www.WissmachGlass.com](http://www.WissmachGlass.com)