



**How to Make a  
Stained Glass Sun Catcher**

*Copper Foil Method*



**By  
The ArTrainers**

**The ArTrainers**

Meenakshi Balasubramaniam  
Juliana Benedetti  
Ameeta Chainani  
Robin Long  
Paul Sweum

For *Fundamentals of Technical Writing*  
Winter Quarter 2008  
Bellevue Community College  
Bellevue, WA

*This document is the property of The ArTrainers.  
All of the contents herein were used for  
educational purposes only.*



# How to Make a Stained Glass Sun Catcher

## *Copper foil method*

*Building a sun catcher is a small-scale project which will give experience in all steps of creating stained glass art. Before beginning the project, read through all of the directions and refer to Resources page for additional information.*

### PART I: Materials, equipment and tools

#### GENERAL WARNINGS & SAFETY

- Women who are pregnant or anticipating pregnancy should not perform these tasks due to the lead exposure.
- Keep work area off limits to children.
- When handling and transporting large pieces of glass, be sure to wear protective gloves.
- Some very minor cuts are inevitable. Minimize cuts by handling glass and glass shards with care.
- NEVER eat, drink, or smoke while working with stained glass. Wash your hands thoroughly with soap and water before doing anything else.
- When working with all components in the glass process, be sure to dispose of waste in an appropriate and responsible manner that

*From a hardware store, your garage, or kitchen:*

- (2) different smooth surfaces; preferably a wood work bench and a second working table.
- (1) portable work tray for small equipment.
- A woodworking panel for assembling the piece. Preferably it should have a 2x3 foot surface with runner pieces along two sides of the panel. These pieces should form an “L” for right-handed folks or should be configured the opposite way for lefties (depends on comfort level of the artist).
- (1) pair of thick rubber gloves for handling larger glass pieces.
- Working apron with tool inserts (recommended).
- Several old rags.
- Small hammers: standard and rubber.
- Pliers: regular and needle nose.
- (1) rubber water heater tub (for grinder).
- (1) small pack of coffee filters.
- (1) picture screw or frame hook.

#### TABLE OF CONTENTS

PART I	-	-	-	- Materials, equipment, and tools
PART II	-	-	-	- Project Construction
PART III	-	-	-	- Glossary
PART IV	-	-	-	- Resources

*From an art supply store:*

- (1) small box paper clips.
- Several pencils.
- Felt tip art pens: white, black and silver.
- (1) 8.5 x 11 inch sheet of each: white paper (standard), carbon paper, and poster board.
- (1) flat plastic tool with beveled edges, in the shape of a large file.

#### NOTES

- Skill level: Beginner.
- Time Required: 4-6 hours.
- If materials, equipment and tools for this project are not provided as part of a course or shop through which you are a student or apprentice, anticipate costs in the area of \$500.

*From a stained glass supply store:*

- Copper shears (special scissors).
- Glass cutter for scoring glass.
- Glass cutting oil (for glass cutter).
- Running pliers.
- Glass grinder (a.k.a. sander).

- Protective glasses.
- (1) bottle flux (see glossary for definition).
- Copper foil tape.
- At least (2) feet of lead came for dry assembly.
- (1) box of 2" flathead nails for dry assembly.
- At least (2) feet of copper wire for hanging piece.
- Soldering set.
- (1) spool soldering lead.
- (1) steel wool brush.
- (1) bottle of patina.
- Glass pieces (quantity depends on the dimensions of your design); typically a variety of colors that the artist likes just be sure to measure the correct amount from the dimensions of the design.
- (1) small box copper eye holes.

## PART II: Project construction

### Stenciling

*You will need: Art pens, white paper, carbon paper, poster board, paper clips, copper shears and smooth table.*

1. Use pen to draw your sun catcher design on the white paper.
2. Number each piece in the design. Use a numbering system that is logical and easy to remember, such as clockwise.
3. On poster board, place carbon paper (with carbon side facing poster board).
4. On other side of carbon paper, attach white paper (with the design facing upwards).
5. Attach paper clips to all sides to secure the three pieces of paper.
6. Place on smooth tabletop, with white paper on top, and trace design. Be sure to trace the numbers you gave each piece.
7. Remove paper clips and separate papers.
8. Cut out each numbered piece using copper shears.
9. Save the white paper. You will use it as your base on the woodworking panel.



Carbon paper.

### Glass preparation (Drawing and Cutting)

*You will need: Glass pieces, art pens, stencil pieces, glass cutter, and pliers*

1. Select suitable glass pieces for your project. Hold the glass up to a light source for a realistic idea of how that piece of glass will look in your finished product. Keep in mind that this is where your creativity makes the most impact on the project.
2. When you are preparing to work with glass, keep in mind that many types of colored glass have a rough side and a smooth side. A good rule is to **always cut on the smooth side**; your cutting will be more accurate and it will help to preserve your glass cutter.
3. Place stencil pieces with numbers facing down on the smooth side (back or rear) of the selected glass surface, and hold them firmly in place. Be sure to place pieces with numbers facing down, otherwise your pattern will be the reverse of the design that you intended.
4. Depending on color of glass, use either pen to trace around stencil pieces.
5. Using glass cutter, score glass along pen-drawn borders. Be as accurate as possible. Better accuracy means less work in the grinding /sanding process.
6. Break glass using running pliers (or other pliers, as needed).



The process of scoring glass.

### Glass preparation (sanding)

*You will need: Glass grinder, eye protection, apron, rags.*

#### Warning

**When sanding glass, wear the necessary protective eyewear.**

1. Prepare glass grinder for sanding the glass (see glossary for grinder components). Make sure the grinder unit is set in the rubber water heater tub to catch excess water and fine glass fragments. Turn on the grinder.
2. Put on eye protection and apron.
3. Create smooth edges on each piece by carefully applying a varying amount of pressure as



A sander (left) with a close-up on the stone bit (right).



you slide the edges of the pieces along the grinder stone. Continue this process until no art pen ink from the tracing can be seen.

4. Wipe down each piece with a rag to remove any water.
5. Turn the grinder off.

### **Foiling, dry fit assembly, and soldering**

*You will need: Glass pieces, copper foil tape, flat plastic tool, lead came, working panel, white paper design, flux, hammer, nails, soldering equipment, lead spindle, copper eye holes.*

#### **Warning**

**ALWAYS solder in a well ventilated area.**

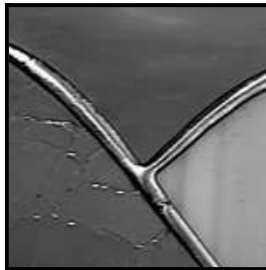
**NEVER leave your soldering iron plugged in when not in use or unattended.**

**NEVER override the grounding system on your soldering iron (or any other tool, for that matter).**

1. Determine length of copper foil tape by wrapping it around each of the pieces separately, using minimal overlap.
2. Remove the adhesive from the copper foil tape and “wrap” it around the perimeter of the glass piece, centering the edge inside the copper foil.
3. Press the edges of the copper foil onto the sides of the glass piece. Use the flat plastic tool to ensure the corners are flat and sticking to the sides of the piece.
4. After assembling the pieces on the working panel (using the white paper copy of design as guide), frame the remaining two sides of the project in place with lead came.
5. Lightly hammer flathead nails around the lead came, to hold pieces in place.
6. Prepare soldering equipment by turning it on and letting it warm up.



Dry fit assembly in progress.



A good solder job. Note how the lead has been distributed evenly along the joint and edges.

7. Apply flux along the edge of all the pieces that are going to be soldered. Flux helps lead stick to areas on which it is applied.
8. Using the lead from the spindle, solder edges of each piece thoroughly. It should cover the entire fluxed joint area, using as little lead as possible.
9. Once application is completed, let lead dry for a few minutes.
10. Repeat procedure on opposite side of piece. Remove lead came that held the piece together. The lead came isn't necessary at this point with one side of the piece already soldered.
11. Solder copper eye holes to the two top corners of the piece (carefully measured) along the back edge, with the eye holes sticking outward (soldering only 1 eye hole is optional, however not recommended, as the piece tends to appear lopsided when it hangs).

### **Oxidation and finish**

*You will need: fused joints, steel wool brush, patina, rags, coffee filters.*

#### **Warning**

**Always use the proper protection when handling patinas and chemical-based finishing solutions.**

1. Scrub fused joints with steel wool brush to remove any excess lead and smooth the edges of the joints.
2. Apply patina with rag. Let dry.
3. Rub sun catcher with a coffee filter to eliminate fingerprints and any excess debris.

### **Hanging the piece**

*You will need: copper wire, screw, hammer, pliers, picture hanging screw or frame hook.*

1. Find an indoor hanging space that brings in light, such as a window frame.
2. Insert and secure typical picture hanging screw or frame hook with hammer and /or pliers as needed.
3. Measure copper wire by feeding it through the copper eye holes of piece and determining desired hanging length from screw or frame hook. Leave approximately 1 inch of extra copper wire on both ends of the eye holes.
4. Twist the extra copper wire around the main copper wire next to the eye holes. Twist until all copper wire slack is gone.
5. Hang the piece.

## **PART III: Glossary**

**Carbon paper** is paper coated on one side with a layer of a loosely bound dry ink or pigmented coating, and is usually bound with wax. It is used for making one or more copies simultaneously.

**Copper foil glasswork** is the art and craft of connecting pre-cut pieces of glass by wrapping their edges with copper adhesive tape and then soldering the edges together. This is commonly called the "Tiffany" stained glass method. One of the advantages of copper-foil glasswork over lead-strip glasswork is that you can form three-dimensional shapes, whereas lead-strip glasswork only allows the creation of two-dimensional panes.

**Copper shears** are scissors longer than 15 cm. Sometimes industry workers make a distinction between shears and scissors: shears have a specific thumb hole and finger hole, whereas scissors have symmetrical holes. Shears are usually used for cutting heavier material than scissors.

**Flux** is a substance that cleans metals before they are joined in the soldering process. In the soldering of metals, flux serves a threefold purpose: it removes oxidation from the surfaces to be soldered, seals out air thus preventing further oxidation, and improves wetting characteristics of the liquid solder. Flux is corrosive, so the parts must be cleaned with a damp sponge or other absorbent material after soldering to prevent damage.

A **glass cutter** is a hand tool which aids in the cutting of flat or sheet glass. The wheel is usually about 5mm in diameter and made of hardened steel or tungsten carbide with its edge ground to a V-section. In use, the cutter or the glass is wetted with oil or paraffin. The cutter is then pressed tightly against the glass. The artist scribes a line to form a split in the surface of the glass, and then bends the glass in the direction that was not scribed. A break occurs along the scribed line.

A **glass grinder** is used to shape glass after it has been cut into a "rough" shape with a glass cutter. Glass grinders have a diamond-coated bit that grinds excess glass from the edge of the piece, allowing glass artists to shape pieces perfectly with smooth, perpendicular edges. Most grinders come with two bits, also known as grinding heads. The larger bit (3/4" or 1") is used to shape larger pieces. The smaller bit is used for detail work and for grinding holes in glass. Most people who plan on doing any type of stained glass fabrication will benefit greatly from owning a glass grinder.

**Lead came** is a divider bar used between small pieces of glass to make a larger glazing panel, sometimes referred to as leaded glass. "Came" is mostly made of soft metals such as lead, zinc, copper or brass. Came generally has an H-shaped cross section, although U-shaped cross sections are used for the borders of panels.

**Needle-nose pliers**; also known as **long-nose pliers** and **pinch-nose pliers** are used by electricians and other tradesmen to bend, re-position, and cut wire. Their long, gripping nose provides excellent control for reaching into small, crowded enclosures. Sharp cutting edges near the pliers' joint provide "one-tool" convenience.

**Patina** is a coating of various chemical compounds such as oxides or carbonates formed on the surface of metal during exposure to weather. For our purposes, this term refers to the bottled patina available in craft and art supply stores.

**Posterboard** is a lightweight (often foam) board used for displaying posters and other printed matter. It comes in large sheets, significantly larger than A2.

**Running pliers** are bent on both sides of the mouth in the shape of a crescent (as a frown). They are typically used in glasswork to break apart pieces of glass that have been scored with a diamond blade. When the handles are squeezed, the bent design forces pressure at opposite angles on both sides of a scored glass piece, breaking it apart along the scored line.

**Solder** is a fusible metal alloy with a melting range of 180 to 190 °C (360 to 370 °F). It is melted to join metallic surfaces in a process called soldering.

**Soldering** is the process in which two or more metal items are joined together by melting and flowing a filler metal into the joint. Heat is applied to the parts to be joined, causing the solder to melt and be drawn into the joint by capillary action. After the metal cools, the resulting joints are not as strong as the base metal, but have adequate strength, electrical conductivity, and water-tightness for many uses.

## **PART IV: Resources**

*Serving as additional resources, here are some helpful websites that further explain the glass process:*

- **Good Q&A and explanation:**  
<http://www.thestorefinder.com/glass/library/howtoTools.html>
- **Detailed information and videos:**  
<http://art-of-stained-glass.com/index.html>
- **Some helpful photos:**  
<http://www.allthingsukrainian.com/Glass/StainedGlass1.htm>