

How to Do Mosaic Stained Glass – Direct Method

There are two basic methods to mosaic work - the direct method and the indirect method. In the direct method, the pieces of material you are going to mosaic with, known as tesserae, are directly fixed up onto a base or substrate and then grouted. In the indirect method pieces are temporarily fixed down onto a removable base material. This is (then) cast in its final form and the temporary base is removed to reveal the mosaic, top side up. The indirect method is most often used when the surface needs to be extremely smooth.

Selecting Tesserae

Tesserae are the individual pieces of material you will arrange to form your mosaic. Most people think of those little squares seen in early Roman mosaics or in swimming pools. Today the term applies to anything pieced together to form a design. Tesserae include:

Traditional Tile Tesserae

- **Vitreous Glass:** Known as Venetian glass it is non porous, stain resistant, and frost proof. Common sizes are 3/4" (2cm) or 3/16" (1cm) squares with a flat top face and a ridged and beveled back. They are available in a wide range of colors.
- **Gold and Silver Leafed:** Commonly found as 3/4" (2cm) squares. They are made by sandwiching gold, silver, copper or gold-alloy leaf between a clear top layer (sometimes colored) and a colored (generally a transparent yellow, green or blue) base. They have flat or rippled surfaces.
- **Smalti:** Handmade irregular rectangles of opaque glass. Generally about 3/4" in size with a pitted, irregular, and very reflective surface.



Ceramic Tile

- **Unglazed:** Commonly found as 1" or 3/4" squares stuck to a paper or plastic mesh. The color is uniform throughout the entire tile.
- **Glazed:** Includes wall and floor tiles, crockery, pottery, tableware and others. The color is a fired surface layer over a clay base. They are a rich source for color, pattern, and texture.



Natural Stone

Includes everything from beach or river pebbles to marble, granite, slate and modern day stone tiles. They have a wide range of colors, textures and surfaces. Also included are semiprecious stones - turquoise, lapis lazuli, alabaster, quartz and agate.



China & Porcelain

A finer form of ceramics, they are a good source for interest, pattern and color.



Shells and Mother of Pearl

Mother of pearl is the lustrous inner surface of shells like oysters and abalone. Commonly used shell forms include spirals, scallops, snails, etc. and cover a wide range of color, luster and size.

Glass

Includes mirror, colored glass, sea glass, glass nuggets, marbles, and pressed glass jewels



Everything Else

Bone, metals, buttons... just about anything you want can become tesserae in your mosaic.

Selecting the Base

You can apply a mosaic to nearly any surface, so selecting the base material becomes a matter of the shape you want, used, and where it will be used. When selecting a base think about the following:

- Is it strong enough to hold the combined weight of tesserae, adhesive, and grout?
- Does the base shape have appeal and good proportions?
- The shape should be suited to the size of tesserae you use. Gentle curves are easier, extreme curves can require pieces in order to "bend" the tesserae with the curve and have a smooth result.
- Can you find the correct adhesive to adhere the mosaic pieces to the base?

Commonly used base materials include but are not limited to:

- **Wood:** Can be cut to shape and size easily, making it ideal for many situations. You can mosaic on most any wood surface, but be aware that no wood is 100% waterproof and wood can sag or warp. Using a high grade plywood (at least ½" thick) will provide a rigid support and help counteract warping. You will want to "tooth" (rough the surface of) and seal the wood before applying the mosaic as added insurance.
- **Terracotta:** Terracotta and clay objects offer a wide variety of shapes and sizes to mosaic on.
- **Cement:** You can add mosaic to pre-made concrete objects like birdbaths, stepping stones and planters.
- **Glass:** You can mosaic on flat sheets of window glass or glass items like bowls, votives, plates, etc.
- **Net:** This is a fine weave resin fiber that acts as a intermediary base. It is easily cut to any size or shape. General fixed to the net, the excess trimmed and then embedded into cement, or grouted and glued onto its permanent base.
- **Walls, fixtures, plaster items, ceramics, containers, trays, found objects...** use your imagination!



Selecting the Adhesive

The base material, tesserae, project use, and its location all influence the type of adhesive you will choose. There is a 'right' situation. Start by reading the 'applications' section on the package. Common choices include:

- **Acrylic Based Adhesive:** Sold under various brand names. For mosaics, thick white glues that dry clear and labeled as PVA (poly vinyl acetate). Select brands that list as 'water resistant'. They are often used for interior mosaics that won't be exposed to the elements. An advantage is that they are very strong and can adhere tesserae to slippery surfaces like ceramic and glass. Diluted, it is useful as a surface sealant prior to applying mosaic or as a strength additive to grout.
- **Cement Based Mortars:** The traditional adhesive made by mixing powdered cement, sand and water. You can also find quick setting, pre-colored, made for glass, Thinset, and traditional mixes. For exterior use, use one that is waterproof and frost proof.
- **Epoxy Resins:** A two part adhesive consisting of a resin and hardener mixed together right before use. They will adhere tesserae permanently to metals. They are often messy, smelly and have different windows of opportunity before they set.
- **Other Choices:** Silicone, silicone-based glues, ultraviolet curing glues, and construction adhesives. Always check and match the adhesive to your tesserae, base material, and the object's final destination.



Basic Tools

Beside a base, tesserae, and adhesive the only tool you'll really need to start with is a tile nipper. All other tools can be found in household items. As you work with different tesserae, bases, and adhesives you will find it useful to add specific tools to your collection.

Cutting Tools are used to shape and trim your tesserae

- **Tile Nippers** are designed for cutting tiles. Good ones have tungsten-carbide cutting edges and spring loaded handles. More expensive models have replaceable jaws and compound leverage. They are suitable for most glass, ceramic, crockery, china, and the like.
- **Tile Cutters** are designed for scoring, cutting and snapping ceramic tile. They have a tungsten-carbide wheel used to score, and a gripper used to break the tile along the score. They are useful for long straight cuts and for use on wall and floor tiles.



- Hammers of all types are useful. Ordinary household versions are suitable for breaking large tiles, crockery, glass, mirror, and such into randomly shaped pieces. For more precise cutting of thick materials like natural stone, a traditional mosaic hammer and hardie (also called a bolster blade) may be preferred.
- Glass Nippers have a set of disc shaped tungsten-carbide wheels set opposite on spring loaded handles. They are used to cut glass, mirror, glass tiles, and the like in a manner similar to tile nippers.
- Glass Cutters are suitable for stained glass and mirror. Cutting curved shapes from these materials is faster and easier.

Containers

For holding your sorted tesserae, mixing adhesives and grouts, adding color to grouts, and holding water for cleaning. Save those containers you were about to throw out! You may not want to clean out that cement or grout containers, these "salvaged" containers can just be tossed out when done.

Adhesive Spreaders

Depend on personal choice and the adhesives. Trowels of different sizes and types are useful for cement-based adhesives. (For small work) plastic spatulas, butter knives, and palette knives work well. PVA and epoxy bases can be applied with plastic spreaders, old brushes, straws, toothpicks, wooden sticks, etc.



Grout Spreaders

Help push the grout over the mosaic and into the spaces between tesserae. They need to be flexible so as not to scratch the surface. Plastic spatulas, squeegees, grout floats, or even gloved hands will work.

Tools for Pushing and Prodding

Are handy for moving pieces into place and scraping out excess mortar or grout. Wooden sticks, wooden scraper, tweezers, dental probes, toothpicks, awls, wooden clothes pins, pencils, and manicure tools are just some of the tools used.

Safety Equipment must include.

- Eye goggles to wear when cutting and breaking up your tesserae.
- A dust mask or respirator to wear when mixing powdered grouts, adhesives, and cements.
- Heavy duty gloves should be worn when breaking materials. Disposable or rubber gloves should be worn when handling grouts, adhesives, and glues.
- Always read and follow the safety instructions that come with the tools and materials used.



Grout

- Grout is what is pressed into the spaces between the tesserae in most mosaics (some are never grouted). It unifies the design and strengthens the piece. Made like cement-based mortars (but with a finer sand), grout comes in fine and coarse forms for filling narrow and wide gaps respectively.
- Some contain polymers for added strength and flexibility.
- They come in neutral, white, gray shades, black, and many assorted colors. Grout pigments or artists acrylics can be added to make a specific color.



Cleaning Articles

Are needed for wiping off excess grout and general tidying up. Lint free rags, sponges, and non-scratch nylon scrub pads are quite useful.

Lets Get Started

Surface Preparation: Base surfaces should be clean and dry. When applying a mosaic to surfaces like wood or interior walls, scoring the surface will add "tooth" and improve the adhesion of your tesserae. Use a sharp knife or similar tool to key the surface. Sealing will also benefit surfaces like wood and terracotta. Use a diluted solution of PVA or similar acrylic bonding agent.

a brush. It is essential to seal all surfaces for wood bases and it is recommended for unglazed ceramic and terracotta.

Tesserae Preparation: All tesserae need to be clean and free of dirt, grease, and dust. Wash your materials before breaking into smaller pieces. Lightly soiled items can be cleaned with a damp cloth. If the tesserae are attached to a mesh or paper, use water to remove the backing and glue. Allow all pieces to dry thoroughly. Shells need to be soaked in water for several days (change the water daily), then allowed to dry out over several days. Pebbles need to be soaked overnight and then rinsed until they are clear. Allow them several days to dry out as well.

Test Your Adhesive: READ THE LABEL! FOLLOW THE DIRECTIONS! It doesn't hurt to test its performance on a small base material. Pay special attention to your choice of adhesive for outdoor projects. Extreme heat and cold can create cracks. Use water to fill the voids - this will destroy your work when the freezing temperatures come.

Designs and Patterns: Inspiration comes from everywhere: nature, cities, surfaces, feelings, dreams, pattern books, and the list goes on. The choice is entirely up to you. You can go from totally abstract to precisely planned. You may want to use an existing pattern. Sketching out a basic cartoon can help you to solidify your idea, as well as to plan for color and movement. Draw guidelines directly on the base for reference. You may want to transfer complex designs to wood or terracotta base with a marker or paper. Large designs can be transferred section by section. Do what makes you feel comfortable, but don't overplan! Some flexibility is needed to make your design dynamic and interesting.

Color: Once you have a design, you will need to fill it with color. Choose what you like! Layout your tesserae and play with different combinations. Lay them on your design to see how they work and look. Keep in mind that each unit is a unit of color, texture, and brilliance. How they play off each other will affect your design. Remember that the viewer's eye will mix the shapes and colors in your design. Instead of covering a large area with the same tile, vary the shades used to add interest (unless the effect is a uniform block of color!). Gradually transition colors into each other by varying the size and shape as they meet each other. Place differing colors together. Place opposite colors next to each other for contrast. Make black or gray lines to accent or separate elements or colors. Take advantage of patterns and colors in your tesserae. Play, experiment, stand back, look, rearrange, stand back, look... - until you are satisfied. Again, do what you like and once you get started don't be afraid to change or let the project unfold.

Cutting the Tesserae: With any new technique or tool it is a good idea to practice on scrap materials (before you attack a piece of really unique china you have). Work in a protected, covered, easy to clean area; you'll be creating shards and stray bits that could cut the unsuspecting visitor. WEAR SAFETY GOGGLES! You can cut all your pieces ahead of time and lay them out on the base; or you can work on the fly - cutting and fixing as you go. The choice is yours and depends on the complexity of the design on the base, and the adhesive used.

- **Mosaic Nippers:** Hold the nippers with the end of the handles in the palm of your cutting hand and the rounded end facing towards you. Using the thumb and forefinger of your other hand to feed the tesserae (face up) into the jaws. Apply about 1/4" (6mm), squeeze the handles together while you press your thumb and forefinger together. Applying equal and opposite pressure will create a straight break. Make diagonal lines by angling the nipper head and aligning your finger and thumb with the direction. Cut curves by removing small bits until you achieve the curve desired. Concave cuts are possible by moving the nipper head and applying pressure and a bit of practice!
- **Tile Cutters:** Place the tile on a flat surface and use the cutting wheel to run a score (line) from edge to edge. Center the tile on an anvil above the score and squeeze the handles gently. If all goes well you will get a clean break along the score line.
- **Hammer:** An ordinary hammer is useful for breaking large pieces or those too thick or too tough for nippers. Hammering is an excellent way to achieve random pieces. To contain the mess, place your pieces in a heavy towel or in a paper or plastic bag before striking.
- **Traditional Hammer and Hardie:** The hardie needs to be secured at a height which is comfortable for your working. Hold the hammer with the chisel pointing up. Hold the hammer firmly but with a relaxed arm. Hold the tesserae centered on the chisel with the thumb and forefinger. Swing the hammer down from above, aiming to align the hammer tip with the chisel tip of the hardie. Too strong a swing will cause the tesserae to break more erratically. Only swing as forcefully as you need to achieve the desired result.
- **Glass Nippers:** Used similarly to mosaic nippers. Align the wheel with the direction of the cut you want and squeeze the handles. The angle and amount of pressure will create differing curves and pattern shapes.
- **Glass Cutter:** Hold the cutter in your favored hand and place the cutter wheel on the glass about 1/8" (3mm) in from the edge closest to you. Place the thumb of your other (guide) hand behind the cutter head to prevent it from rolling back. Apply a constant pressure straight down through the cutter onto the glass and roll the cutter wheel away from you all the way across the surface of the glass.
 - **Breaking with Hands:** Form both hands into fists and place the glass between your thumbs and index fingers. Run a score line between your thumbs. Your fingers should be clenched underneath the glass with knuckles touching the glass firmly at the end of the score. With a quick even snap pull outward and roll your knuckles by spreading them apart to break along the score.
 - **With Breaker-Grozier Pliers:** Form one hand into a fist, placing the glass between your thumb and index finger.

score line. Position the flat jaw of the breaker-grozier pliers on the top side of the glass with the jaw parallel and as close to the end of the score as possible. Hold the glass firmly in your hand and apply quick, even pulling outward, then snap down with the pliers.

Applying the Design

- **Cementing:** Mix your cement according to manufacturer's instructions. You are aiming for a consistency like cake mud. Spread the cement onto a small area of your base using a spatula or notched trowel. The thickness depends on the thickness of the tesserae. You want the cement to grab the piece yet leave enough open space between pieces for grout. You don't want it to ooze above the finished surface of the mosaic. Press the tesserae into the cement until you hear a pop, then repeat the process. You can also "butter" the tesserae (instead) using a small trowel or palette knife. This works better for larger pieces or if the cement base is not quite thick enough. It isn't really suitable for small tesserae.
- **Mosaics Without Grout:** Shells and stones are too textural and porous for grout; mosaics having tesserae with a very thin thickness; and some types like smalti and vitreous glass tiles fit so tightly together that grout is unnecessary. For shells and stones, a cement based mortar is recommended. For scallop-type shells you will need to "butter" and fill the concave with cement mortar before placing them.
- For glass tiles and smalti, you can use either an acrylic-based or cement-based mortar. Color can be added to the mortar to suit your design (remember, you will have no grout to add color to your design, so your only chance for added color is in the mortar). Apply the mortar to the base, the thickness dependent on the tesserae used. Stones and pebbles can be pushed into the mortar, fitting them snugly. The cement will ooze up between them and become self grouting. If your tesserae are of different thickness, lay a thick mortar base and push the tiles in only to the desired level.

Grouting

Grouting is the technique of filling in the spaces between your tesserae. Generally, it is desirable to make the grout level with the height of the mosaic surface. Grout is just a fine textured version of cement mortar. It unifies the design. Its color enhances the design and it adds strength.

- The choices of grout color are endless. There are colored sands and premixed grout colors. You can make your own grout pigments or artists acrylics to your colored sand or white grout mix.
- Allow the cement to properly cure according to the manufacturer's recommendations. This will be at least 24 hours for indoor mosaics, 72 hours for outdoor mosaics.
- Mix grout according to the manufacturer's directions following all safety precautions. Add color until you achieve the desired noting that it will be slightly lighter when dried. If you are not sure of the color, test it using the piece you used to test the adhesive, or test on a small inconspicuous spot on the actual mosaic piece. You don't have to use the same color throughout the piece.
- Scrape out any excess mortar between your pieces.
- Put on some gloves and spread the grout on the surface using a plastic spatula, squeegee or your hand. Make sure the grout goes down into all spaces and cover the entire mosaic.
- The grout needs to partially set before you remove the excess. Refer to the manufacturer's instructions, generally 15-30 minutes. Use a clean, lint free cloth or a damp sponge to wipe off excess grout. Be careful not to dig into the grout.
- Once you have removed the excess grout you will have a haze over the surface. Buff it off using a clean lint free cloth or crumpled newspaper. If you have specks of grout stuck to your tesserae remove them using a non-scratch nylon brush, wooden stick, or similar tool that won't scratch your surface.

Finishing

Some materials and applications benefit from an application of sealant after the grout is dried and cured. Sealing pebble mosaics helps bring their true 'wet' color. Porous materials benefit from sealing also. Sealers are available in a matt or shiny finish. Read the instructions to see if it fits your application.

Now, stand back and admire your handiwork!

There are variations on the technique presented here and many excellent book resources (see below) to help you expand your knowledge and creativity. As you experiment and work with different materials you will discover what methods, tools, and materials are best for you!

Books and Article Resources

Ancient Mosaics

by Roger Ling Paperback

Princeton University Press

Paperback / 1998 / 144pp

ISBN: 0691004048

The Art of Mosaics

by Joaquim Chavarria

Watson-Guption Publishing

Paperback / 1999 / 160 pp

ISBN: 0823058646

The Art of Mosaic Design: A Collection of Contemporary Artists

by J.Locktov - L.P.Clagett

Rockport Publishing

Hardcover / 1998

ISBN: 1564964205

Backyard Mosaics

by Connie Sheerin

Sterling Publishing

Hardcover & Paperback / 2001

ISBN: 0806929677

Classic Mosaics

by Elaine M Goodwin

Trafalgar Square Publishing Lt

Hardcover / 2000 / 144 pp

ISBN 1570761590

Encyclopedia of Mosaic Techniques (Encyclopedia of Art Techniques)

by Emma Biggs

Penguin USA

Hardcover / 1999 / 160 pp

ISBN: 0762404442

Making Mosaics

by Leslie Dierks

Sterling Publishing Co.

Hardcover / 1998 / 128 pp

ISBN: 0806948728

Mosaics

by Kaffe Fassett & Candace Bahouth

Taunton Books & Videos

Hardcover / 1999 / 160 pp

ISBN 1561583731

The Mosaic Book : Ideas, Projects and Techniques

by Peggy Vance, Celia Goodrich-Clarke

Trafalgar Square Publishing Lt

Paperback / 1996 / 128 pp

ISBN: 1570760608z

Mosaic Workshop : A Guide to Designing and Creating Mosaics

by Emma Biggs, Tessa Hunkin

Trafalgar Square Publishing, Lt

Hardcover / 1999 / 128 pp

ISBN: 1570761493