How To: Stained Glass

by scoochmaroo on July 29, 2011

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http://www.instructables.com/id/How-To-Stained-Glass/
Intro: How To: Stained Glass
Stained glass is easier than it seems. Although it does require a special set of tools and equipment, once you have access to these, you'll find that the process of turning your designs into gorgeous stained glass pieces is really quite simple! My brother and I started working in stained glass at our father's side when we were just 8 and 10 yrs old, so I can confidently recommend this to a wide range of ages and skill levels.
Step 1: Tools and Materials

There's a broad range of really fun materials involved in stained glass. Here are a few essentials to get you started. You can always add to your collection as you go along (and trust me, it's hard not to)! It's best to find a specialist stained glass supplier for these materials.

Glass (obv. Hard to do a glass project without glass) - there are SO many kinds of glass available! I used a combination of streaky and textured glass for this project. You'll see the wide world of glass available to you when you visit a stained glass supplier!

Glass Cutter - these also come in a variety of styles. Here you see a tungsten carbide wheel cutter which has an oil reservoir in the handle. I also like using a pistol-grip style cutter with the same features, but in a more ergonomic design.

Cutting Oil - required to prolong the life of your glass cutter and improving the quality of your score on the glass.

Pliers - Do not use ordinary house pliers for this! There are two styles of pliers used in stained glass. Grozer pliers are designed for breaking glass and nipping off little edges. Running pliers are designed for snapping long cuts in the glass.

Copper Foil - Some stained glass works use lead came, which is a lead channel that holds pieces of glass together. This is a completely different technique than I am showing you. This technique uses copper foil which has an adhesive on one side to hold the glass pieces together. Copper foil comes in a variety of widths to accommodate different thicknesses of glass. The copper foil is what gets soldered to hold the glass together! Copper foil also comes with silver or copper backing. This is important to keep in mind for the design of your piece. If you are using clear glass, the backing of the foil will be visible. I used silver backed foil because I wanted the finished piece to be silver. There are patinas available to change the finished color of your solder if you like.

Soldering Iron - You'll need a soldering iron that's designed for stained glass, minimum 75 watts. These come with a variety of tips. For most projects, I prefer a wide soldering tip.

Solder - Solder is a mixture of tin and lead. Solder with a higher tin content has a lower melting point and will flow more quickly, with a more silvery finish. Lead free solder is also available.

Flux - Flux is available in liquid or gel form (I find the gel to be more forgiving to work with), and is used to assist the solder flow between the copper taped pieces. Brush every copper foiled surface with flux before soldering every time for best results.

Grinder - if you're just starting out and don't want to make a big investment, you can use a Carborundum stone to file down the sharp edges of your glass after you've made the cuts. If you can get access to one, I recommend an Electric Glass Grinder which makes quick work of the job. It has a water-cooled grinding wheel that can rapidly grind down rough edges and even help achieve shapes that are more difficult to cut.

Safety Glasses - any type will do as long as they completely protect your eyes. When you're cutting and grinding glass, little flecks of it will be flying everywhere! For this reason, I also recommend long sleeves when using an electric grinder.

Safety Gloves - I've never used gloves during this process, but after counting the cuts on my fingers and hands from this last project (well in the double digits), I'm going to give latex gloves a shot for the next one. Let me know if you've ever tried this and what your experiences were!

Lightbox - A lightbox will help you transfer your design from paper to the glass. If you don't have access to one, just cut out the paper pattern and trace it onto the glass.
Step 2: Design

The first step is to know what you want to make! I decided to only use the glass we had on hand rather than go out and buy anything new. This limited both the size and subject matter of my design. Since we had some lovely red-orange streaky bits of glass, I decided to draw up my favorite flower - the poppy!

I did a google image search for poppies and did some thumbnail sketches of some photographs I saw. I decided on this image from http://poppieshealingnetwork.wordpress.com/ for my final design. I had to simplify some of the edges to make it workable in glass.

I then took the thumbnail I had made and blew it up to the actual size of the finished piece. Again, this size was determined by the amount of glass I had on hand to work with.

Graph paper makes this thumbnail-to-working-design process a breeze. Every square in the thumbnail became three squares in the final design. Easy!
Step 3: Tracing the Design onto the Glass

Since I had access to a lightbox, I was able to put the pattern underneath the glass pieces and trace them onto the glass directly. I first traced the pattern with a thick black marker. Then I traced the shapes onto the front of the glass with the same pen (you can buy specialty pens for this, but a Sharpie works just as well).

When you have a lot of similar pieces, it helps to number them so you remember where each of them goes. You can see how I did this with the clear squares of glass in the last picture.
Image Notes
1. cleaning the glass first makes it easier to draw on

Image Notes
1. the stem shape traced onto the green streaky glass

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**Step 4: Cutting Straight Lines**

Using a ruler, align your glass cutter so that the wheel is aligned over the line you are trying to cut.

Start at the edge of the glass and score in a single movement all the way across the line you want to cut. Do not stop and start the score in the middle of a piece of glass. The glass will always break all the way across the piece - where you score the glass with your cutter controls where that break happens.

If you are using a textured glass, create the score on the smooth side.

You can break the score by holding it on each side and snapping it apart with your hands. Alternatively, use your pliers to put pressure on the score line. Line up the middle of the pliers with the line you are trying to break and squeeze. The glass will break along your score line!
Step 5: Cutting Curves
Curved lines are trickier to cut, as sometimes the glass will break in its own direction. Keep your curves gentle, and you should have no problem.

Score the curve in the same way you did straight lines - from one edge to the other - following the line of your curve. I prefer to use pliers to add pressure to curved scores to help them snap. Another technique is to tap the scored line using the end of your cutter. It will assist the fracturing of the glass.

When cutting deep curves, attack it as a series of shallow curves (see last picture). Otherwise, the glass might break off in its own direction. You can use your grinder to deepen the curve even more if needed.

Step 6: Grinding
Now that you've cut all of your pieces, it's time to clean up the edges and make sure they all fit together.

I put the pieces back on the pattern on the lightbox so I can draw corrective lines as needed (see second image). I take the pieces to the grinding wheel and gently grind away rough edges and fine-tune the shapes. Be patient with this - too much pressure against the grinding wheel can cause the glass to chip!

To make sure all of my pieces are fitting together snugly as intended, I build a frame around them (see final picture). This also helps during the soldering process to make sure the piece remains flush and square. More than once I've created a piece that has (unintentional) funny slants and angles to it because I forgot this step!
Step 7: Copper Foil

The next step is to foil all of the pieces. This is fairly easy, and fairly time-consuming. The more care you spend foiling your pieces, the better the final soldered result will be. It's easy to let the copper foil tape get off-centered here and there, so pay special attention to keeping it all even.

Once you've decided on the proper thickness of copper foil for your glass, peel the protective backing off of the foil. Center you glass on the tape and press it securely along all cut edges.

Rub the edges of the foil along the front and back edges of the glass with a firm instrument (this soft pencil was no match for the hard corners of glass). Take care to make sure the tape is very securely adhered and even. If it gets bunched up, just tear off that section and start again. You can always overlap pieces of copper foil, but take care to align the edges or else they will show up when soldered!
Step 8: Soldering

Soldering happens in a series of steps. First tack together your pieces, then tin the seams, then add the bead.

Flux must be applied to the copper foil before soldering.

To tack solder the pieces in place, apply dots of flux to desired areas, and melt a small blob of solder on top.

Because I was using two different widths of glass, I originally tacked and soldered the piece from the back side so that the front would be flush.

Once all of the pieces are tacked together, you can tin the seams. This just means you apply a thin, flat amount of solder to all of the seams, completely coating all of the copper foil. Be sure to apply flux to all of the seams first.

Bead soldering refers to a smooth, slightly rounded flow of solder used to create an aesthetically pleasing finish. You only need to apply the bead solder to the front of the finished piece, as the tin solder is sufficient to hold together the back. To create the bead solder, apply a new layer of flux to the tinned seams. Melt a larger amount of solder onto the seams. Run the soldering iron back and forth along a small distance to create a melted seam of solder. Once a section is completely melted, gently lift the soldering iron up from the piece to create a smooth, shiny bead. This just takes practice.
1. applying flux before tack soldering pieces together

1. one tiny blob is enough to tack the pieces together

1. all pieces are tacked to each other

1. tinned seam
Step 9: Frame and Hang

I used lead channel to finish this piece, although it is not necessary. I cut the channel to fit around three edges of the piece and soldered them together at the edges, and soldered it to the glass pieces at every intersection. This works exactly like soldering the copper foil.

To hang the piece, I soldered on two loops of tinned copper wire (see second image). This was plenty of strength to hold the weight of this piece.

Finally, clean your piece well with a mild detergent or glass cleaner, and display in a well-lit environment.

I hope these few basic steps are enough to encourage and inspire you to try your hand at stained glass. From here, it's just a small journey to creating all sorts of decorative and three-dimensional pieces. Have fun, and be sure to share your own creations in the comments below!
Related Instructables

- Faux Stained Glass Owl by Creativeman
- Stained Glass Bird (Photos) by Bown86
- How to clean chewing gum stains from your clothes: it's easy (+ video inside) by bluesman
- Stained Glass Bottle Lamp by just1rick
- Plastic Bottle "Stained Glass" Candleholder by CrystalStranger

Comments

21 comments  Add Comment

sunshine says:
Thanks so much for sharing this! Very pretty!

Carleyy says:
Really pretty :)

Mauigerbil says:
Cool project! I <3 the flower

studleyee says:
Brings back memories of coming home from college and seeing my mom soldering stained glass. She used a 'buttering'-like technique when soldering for character and I ( and electronics person ) would do a 'flow' soldering and she'd say it was too neat looking, but she'd line up panels for me to do :) Love stained glass! Thanks for sharing this great article.
-Lee

Mrballeng says:
Could you use clear/smoked glass from the hardware store? Or is stained glass specific to the craft?

Mr.Sanchez says:
AWESOME....!!† GOOD JOB...

scoochmaroo says:
Thanks! It's super fun. I wish I had the set-up at home, I would definitely do more of it.

Mr.Sanchez says:
Just one question...do you think a Dremel Stylus could work to Grind the Glass.?

scoochmaroo says:
If you can get a diamond wheel, you should be all set. Not sure how you would keep the glass wet though, as it's critical to keep the glass item well lubricated to keep it from overheating and cracking.

morthole says:
This could be but takes a long time to grind 2 or 3 mm. Best is to cut very accurate if you cut 2 or more mm to big it takes a long time with a "dremel" and a small bit to grind this away.
If your going for this hobby a grinder is a good investment.
Scoochmaroo nice instructable.

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Mr.Sanchez says:
Ok...I´ll try...your project encourage me to try something that I always want to do...

MsJaxFla says:
Great job teaching us step by step. Wondering if I can do this now. I always thought you had to have a kiln....... laughing and so very encouraged and wanting to try it sometime in the near future.
I really learned a bunch....... thanks ever so much.

Creativeman says:
Very pretty piece, scooch! Takes me back to the late 70's, early 80's...stained glass was very "in" at that time.

BodenM says:
I remember watching my grandfather make these, using a cutting wheel and a tool that sprayed a wide, thin fan of water to keep the glass cool.

Kryptonite says:
That's incredible, nice job! I was reading a little about traditional stained glass windows and I was wondering how it could be done in the home, and you've certainly answered that one for me! :D

tinker234 says:
wow hey could i use a raver knife to cut the glass

rocketglass says:
I have been working with stained glass for years. It very relaxing. I would tell everyone to try it once. They just might it.

TheGeek1984 says:
That's really good. My Grandmother did a lot of this when she was staying home to care for my Grandfather, but she hasn't done much since he passed and she went back to work. She's really good though, I should find some of the pictures I took of her work and put them up...

ChrysN says:
Cool, I always wanted to try this, but didn't know where to begin.

angelabchua says:
gorgeous. Because I am the crazy dog lady, I kind of want to try and make something like this of my doggies

jessyratfink says:
The finished project is so pretty! I had no idea how this was done - it actually doesn't seem too bad. Makes me want to give it a try. :)