

Gilding and Patination

Gilding is the process of applying a very thin metal leaf to a surface using an adhesive. Patination is the chemical modification of metal leaf using mild chemical acids to produce color changes. Gold is resistant to oxidation and will not patinate, however, metals such as silver and copper and alloys of these metals will patinate. Imitation silver (aluminum) has a native oxide that is resistant to oxidation, so it will not patinate, but may darken a little.

Gilding can be used as an accent ring, to embellish the inside of a box lid, to cover an entire piece or accent the ball on a finial. David Marks signature technique involves placing a small live maple leaf on the adhesive before applying a leaf that can be patinated. He then removes the maple leaf and replaces it with real gold that will not patinate, resulting in gold maple leaves in a field of patinated gilding. You can also leave gaps in the gilding so the painted substrate shows through or fill the gaps in with a different kind of leaf. You may want to have some kind of defining line such as a groove or sharp transition at the edge of the gilding so there is a clear stopping point. However, in the Marks video below, some of them had a random edge with no hard line and it looks pretty nice – your choice. Let your imagination run wild... it is just another design tool. Some examples are shown at the end of this document.

Metal leaf used for gilding typically comes in packs of 25 sheets that are 3 3/8" square for pure gold and silver. Imitation gold, which is an alloy of copper and zinc often called Dutch metal, comes in 25 sheet packs that are 5" square. The typical thickness of gilding leaf is around 3 millionths of an inch, so it is difficult to handle, and special techniques are used to move and place it.

Adhesives designed for gilding, come in two varieties – water based and oil based. The two adhesives (brush on and spray) shown below are water based. Oil based adhesives tend to dry more slowly and are normally used by professional gilders. Gilding adhesives are unique in that they have two drying periods – first drying to tacky at which point you apply the leaf and second finish drying. The brush on dries tacky in about 5 minutes and can stay tacky for several hours. The spray on dries tacky in a couple of minutes and stays tacky for 24 hours but leaves a pebble-like finish that shows through the finished leaf. Both finish drying in about 24 hours after the leaf is applied.



The gold leaf adhesive and gold leaf (Dutch metal) and silver leaf (aluminum) can be purchased from craft stores such as Michaels and Hobby Lobby, and on-line, typically for around \$10. You can also buy Dutch metal that has already been patinated (6 leaves to a pack for \$7), although the patination patterns are not all that attractive. Patination chemicals vary widely and each can produce a slightly different spectrum of colors. Science Company has a list of chemicals and the colors they produce in this link <http://www.sciencecompany.com/Do-It-Yourself-Patina-Formulas-W12C672.aspx#12> . Unfortunately most of them require heat which is not compatible with adhesives and wood substrates. Sodium sulfide fused flakes (Na_2S) works well for Dutch metal and pure silver and will produce orange, brown, green and blue. Potash Sulfurated (K_2S_n) does not work very well on Dutch metal, but gives a broad range of browns to golds to blues on real silver. Both can also be used in combination on silver.

David Marks (www.djmarks.com) has a very good DVD describing how to gild and patinate – DVD4 at <http://www.djmarks.com/estore/products.asp?cat=190>. He also has a free video taken during one of his classes that shows gilding and patination (second half of the video) http://www.djmarks.com/stories/djm-videos/Turning_And_Gilding_Class_Highlights_134435.asp . Chemicals can be purchased on-line. The websites <http://www.dickblick.com/categories/goldleaf/> and www.artchemicals.com have a complete line of everything needed for gilding and patination.

Gilding

Gilding involves technique, so try a few practice boards before you attempt to gild an important piece. Once you have worked out the basic steps, it is a pretty easy process. Before gilding, consider how you are going to prepare the substrate to which the leaf will be applied. If the surface is not sealed, the first coat of adhesive may dry too quickly and the leaf will not stick. Remember that the leaf is very thin and will transmit the surface texture through the leaf, although this may be desirable for something such as a carved substrate. Also, you might want to paint the surface a bright color and tear the leaf during application to expose the underlying color through the gilding.

When you apply the adhesive, you will let it dry until it is slightly tacky when you touch it with your knuckle. It should feel like touching the sticky side of blue painter's tape, but not leave a mark when you touch it. However, remember if you leave a mark in the adhesive, it will telegraph through the leaf and show. This is less of an issue if you patinate, since the coloring will hide a lot of surface irregularities.

Applying the Gilding to Wood

1. Sand the wood to whatever surface roughness you want to show through the gilding leaf.
2. Seal the surface with a coat of any finish that does not have wax. You can also use a "primer" coat of the adhesive and let it dry completely before adding a second coat to adhere the leaf. If you are going to paint the surface, let it dry and sand or buff with a ScotchBrite pad to remove dust nits that will telegraph through the leaf.
3. Apply the adhesive with a brush or spray can and let dry until tacky to the touch of your knuckle. The time will vary widely based on temperature and humidity. I typically prepare a small test piece so I do not mark the actual piece with my knuckle when testing. With the commercial oil adhesive size, it will generally take 30 minutes to several hours before it is ready for the leaf and will stay sticky for an equal amount of time.

4. Apply the leaf. This can be tricky, but is not critical. By that I mean that picking up and moving the leaf can be tricky, however, leaf is very forgiving, and voids can easily be filled in and the “joints” between the pieces disappear. You can pick up the leaf easily by:
 - a. Folding back the tissue covering the leaf in the pack, exposing most of the leaf. Hold your thumb over the tissue covering the remaining leaf to pick it up. DO NOT move quickly, as even wind currents can tear the leaf. Place the leaf face down on the wood and press on the back of the pack to adhere the leaf.
 - b. Folding back the tissue completely and place a piece of Saran wrap or waxed paper on the exposed leaf and press down gently. The leaf will adhere and you can lift the single sheet of leaf out of the pack and apply it.
5. After applying, press down or pat gently through the tissue. Lift the tissue/waxed paper and if some leaf stays on the tissue, use it to fill any voids in the leaf already applied. There will be pieces of leaf that are not glued down and will be hanging loose – that’s normal.
6. Using a brush, tamp or dab the leaf with the ends of the bristles to force the leaf to bond to the wood surface. Do this over the entire surface that has been gilded and then start brushing gently to remove the loose leaf. With a combination of tamping and brushing, you should be able to make the surface appear smooth and uniformly gilded. If you are leaving gaps in the leaf to expose the painted layer beneath or to follow up with a different leaf, be careful in this step, because the loose pieces of leaf will float around and attach to the exposed adhesive in the gaps. To keep the substrate paint exposed, tamp to adhere the leaf but not brush to remove the loose leaf until the adhesive has dried. If you want to apply a second different leaf, apply it now and then brush both to remove excess leaf.
7. You can cover the bound leaf with Saran wrap and buff the surface with a cotton ball to burnish it for a smoother appearance.
8. Let the adhesive dry for a while, preferably for 24 hours. If the foil is Dutch metal or real silver, it will tarnish over time and needs to be overcoated with clear spray finish. If you are going to patinate be sure to skip the overcoat.

Patination

This is a pretty stinky process, because both of the chemicals mentioned above contain sulfur and will produce hydrogen sulfide (H₂S), which smells like rotten eggs, so it is best done outside. It is not dangerous, given the amount produced, just stinky.

Before patinating, it is best to let the adhesive dry completely, especially if it is water based. When you apply the chemicals, they may soften an uncured adhesive and allow the gilding to be scratched or even detached. Just try some test boards and see what works in your shop.

When patinating, the goal is to have variations in the colors and shapes. This variation is determined by the technique used to apply the chemicals. The good news is that patination is a relatively slow process, so you have time to “play around” with the application. Unfortunately, the gilded surface is somewhat hydrophobic or water repellent, so something is needed to keep the chemicals in contact with the gilding. I typically dip gauze or cheese cloth in the chemical and then drape it randomly over the surface being careful not to completely flatten it. You can also put “scrunched” tissue paper on the surface and mist it with water to hold it in place while you apply the chemical with a brush. The voids in the contact help with the randomness of the patination. David Marks uses the plastic netting or mesh

that some fruit is packaged in and applies it to the piece before applying the wet tissue, resulting in imprinting the mesh pattern in the patination. As the chemical reacts, it is used up, so several applications may be required, depending on the amount of patination desired. You can also use a heat gun to speed up the reaction in selected areas, but do so carefully. Also, the longer you patinate, the more likely you will get some holes in the gilding because of pinholes in the gilding that will allow the patination chemicals to penetrate to the adhesive and release it. The chemicals can also etch all the way through the leaf and expose the adhesive and the substrate.

Patination colors come from thin films of oxides and sulfides produced by the chemicals. As such, they are fairly fragile and will require some kind of coating to protect them. Typically the coating will change or eliminate some of the colors that are produced, especially the greens and blues. It is pretty frustrating to produce a beautiful patination and then have it change when the top coat is applied, but it is the nature of the beast. I have experimented with several spray can finishes, such as urethane and lacquer and none seem to make a significant difference in the loss of the darker colors. Krylon clear spray seems to leave more of the blue than the other finishes, although I have not proven it conclusively.

Applying the Patination to the Gilding

1. Mix the chemical(s) approximately $\frac{1}{8}$ teaspoon chemical to $\frac{1}{4}$ cup of water (60 ml). The amounts are not critical. They can be stored for about a day before losing their effectiveness.
2. Apply the chemicals by,
 - a. Brush or sponge, especially a natural sponge (wet first and squeeze out the excess water)
 - b. Wet cheese cloth with the chemicals, squeeze out the excess and apply to the substrate in a random pattern and then apply additional chemicals randomly with a brush
 - c. Crumple tissue and then spread over the surface, mist with water to adhere in random spots and then apply the chemical randomly with a brush
 - d. Spraying the chemical from a squeeze bottle, however, this does not produce a very pretty pattern.
3. Periodically lift the tissue or cheesecloth to inspect progress of the patination. Add more chemicals if patination seems to slow down. Also, heat will increase the reaction – something as simple as moving out into the sun may help.
4. Patination pretty much stops when the surface dries. I have tried rinsing with water, but that seems to make the patination more uniform, so I do not recommend it. When patination is the way you want it, just blot gently with a paper towel and let it air dry. Keep in mind that the patination reaction will continue a little more while drying.
5. Top coat the patinated surface with a clear spray finish. As mentioned above, there will be some changes in the colors when you do this, especially the loss of greens and blues.

Tips on Patination

1. Patination is about half skill and experience and half luck or environmental conditions, so prepare a test board when you prep your piece for gilding and patination.
2. Lighter patination is easier to control than heavier patination.
3. Choose the best chemical for the leaf you use – sodium sulfide for copper and Dutch metal, and potash sulfured for real silver. Just try it and have fun!



