

Working With WATER-SOLUBLE DYE

Dennis Belcher

All wood finishes have their strengths and weaknesses. One technique I have used for years is coloring with water-soluble dye. It has low odor, and I like that I can finish pieces during the winter months without concern about strong smells and potentially harmful VOCs (volatile organic compounds) wafting from my basement workshop into my home. Since water is the solvent, it is not a fire hazard. Water-soluble dye is transparent and does not hide the wood, but rather enhances the complexity of the grain. In this way, it is a process that builds upon your understanding of the characteristics of wood. Finally, applying water-soluble dye is forgiving—no worries about runs or lap marks.

The primary drawback is the number of days it takes to apply water-soluble dye, along with layers of a topcoat. Each application of dye should be allowed to dry thoroughly before recoating. And I use as many as sixteen coats of wipe-on polyurethane over the dye to give the finish a sense of depth. It is not a lot of work, just a lot of drying time. That may go against some turners' desire to complete a project quickly.

The dye is also unforgiving, in that splatters will color anything it touches—the floor, your shoes, socks, or pants. Old clothes and/or an apron are a must. A drop or two on your white socks will change the

color of an entire load of laundry, so beware. (This is the voice of experience talking.) Protect the floor where you are working. The dye splatters easily and will stain concrete or anything it touches. An alternative is to apply it outdoors, over grass. Complete the dyeing outside and then bring the piece inside to dry. Protect your hands with quality gloves. The dye is very difficult to remove from under your fingernails or your skin.

Overall, the benefits definitely outweigh any challenges in working with water-soluble dyes. The effects you can achieve are impressive. Following are some tips for using water-soluble dye on turned items.



Wood selection

Wood selection and an understanding of the grain are keys to leveraging this technique. Dye molecules are extremely small and will be absorbed deeply into the wood where it is porous and not as deeply where the wood is dense. A wood knot is dense and will absorb less dye. Endgrain, by contrast, will absorb dye far into the wood. This difference can highlight beautiful, natural patterns. A successful finish rests on your understanding of the wood.

The conflicting grain found in curly maple, birds-eye maple, or crotch wood is particularly well suited for transparent dye (*Photo 1*). The species of wood is not as important as the complexity of the grain patterns.

This technique can also be used on carved patterns in straight-grained woods. The dye will accentuate the patterns because of the difference in

When shopping, look for a dye that uses water as its solvent, is lightfast, transparent, and formulated for wood.

Choose interesting grain



1 This crotch maple bowl's conflicting grain makes it an excellent candidate for dyeing.

Ready your materials/supplies



2



3

(2) Water-soluble dye comes in a fine powder in packets or bottles. Mix and store the dye in airtight plastic or glass containers along with a foam brush for application.

(3) Make sure to have on hand a large bucket, fresh water, foam brushes, dye containers, paper towels, gloves, and safety glasses.

absorption characteristics of endgrain and sidegrain. (See *Dye Layering sidebar*.)

Wood and product prep

The dye will highlight any imperfections in your work. Wet the surfaces and inspect for any surface undulations, unintended variations in the curves, tool marks, or sanding marks before you apply the dye. A gloss topcoat will further highlight any flaws in your turning or sanding, so it is worthwhile to spend the time needed to prepare the wood properly.

Initially, it is not necessary to sand beyond 220 grit. The wood will be soaked in water several times, which will raise the grain and necessitate more sanding. So don't sand beyond 220 grit at first.

Water-soluble dye, generically called aniline dye, is a fine powder that must be mixed with water. When shopping, look for a dye that uses water as its solvent, is lightfast, transparent, and formulated for wood. I recommend calling dye manufacturers, or researching online, to determine the lightfastness of various products. Strong UV rays will cause the color to change. Lightfastness is a measure of how resistant the finish is to sunlight. This will vary by manufacturer and by

the color of the dye. Look for a high lightfast rating.

A small amount of dye goes a long way. A teaspoon of dye mixed with 8 ounces of water yields a substantial supply of finish. My practice is to mix the dye in plastic or glass containers with an airtight lid. I leave a foam brush in the container for reuse. My experience is that the dye will stay

good for years, as long as the container is airtight. When my supply runs low, I simply add dye and water to the container, or add only water if the dye has thickened (*Photo 2*).

A pile of clean paper towels, several jugs of water, a five-gallon bucket, and safety glasses complete the necessary supplies (*Photo 3*). It is important that all the supplies be within easy reach. ►

Dye Layering

Dye layering is frequently associated with highly figured woods, such as the curly maple shown in *Photo a*. The naturally varying density in figured wood absorbs dye at different rates, thus emphasizing the grain.

However, you can also use dye layering to emphasize the difference between endgrain and sidegrain by carving in plain wood. The small size of dye particles means the dye will penetrate deeply into endgrain, the natural path of water within a tree. Water-soluble dye will follow the same endgrain path readily, while sidegrain has much less absorption. You can use this difference intentionally to achieve depth and color variation (*Photos b, c*).



a

Curly maple is an excellent wood for dye layering.



b

The shell pattern carved into the face of this piece of plain hard maple increased the amount of exposed endgrain, which absorbed dye at a different rate than the wood adjacent to it. Varying the extent of dye absorption through carving can be used to interesting effect.



c

This vase combines two uses of dye layering. One, the curves at the neck and near the bottom expose more endgrain, resulting in a gradient effect. And two, the black dye remains in the valleys of the carved elements, adding more visual complexity.

Apply, rinse, wipe



4 The author applies a first coat of black dye using a foam brush. Flood the surface and allow the dye to be absorbed into the open wood grain.



5 Rinse the workpiece with clean water to wash away excess dye from the surface. Then wipe off as much of the black dye as you can using clean paper towels. Rinse again and blot dry.



Once dye gets on your gloves, you will stain anything you touch.

The dyeing process

You can layer dye by using washes of two different colors. Typically, I use an application of black (*Photo 4*), followed by red or blue. Open grain will absorb the first coat of dye deeply into the wood. Where the wood is less porous, the dye will not absorb as deeply. The difference in absorption results in a darker color where the black is deeply absorbed and a lighter color where the black did not penetrate as much into the wood.

Hold your completed piece inside a five-gallon bucket, and flood the surface with dye using a foam brush. Allow the dye to absorb into the wood for a few minutes, then again hold it in the bucket and rinse it with clean water (*Photo 5*). Wash away as much of the black dye as you can. Then wipe the entire piece with a paper towel, soaking up as much of the remaining dye as you can. Rinse a second time and use fresh paper towels again to blot up the water (*Photo 6*). The intent is to remove the black dye wherever it has not been fully absorbed into the grain. This sets up the color change

that occurs when the second dye color is applied.

Allow the piece to dry completely, then sand the entire form with 220-grit abrasive. Remember, the intent is to have color variation in the final form, so sand away the black that is on the surface of the wood. Sandpaper will cut aggressively on any edges of wood, so it is better to use non-woven abrasive on the edges.

Just like the mixed wet dye, the sanding dust will color whatever it touches. I wear a mask to protect my lungs and safety glasses to protect my eyes, and I sand over an old towel to catch the dye dust. The towel is thrown away when the project is completed.

The piece will look blotchy at this point (*Photo 7*). Wipe off any sanding dust, empty your bucket, and replenish your fresh water supply in preparation for the second wash of dye.

With your piece again inside the bucket, flood on the second coat of dye, covering the form until it is saturated. Here, I am using a secondary color, blue (*Photo 8*). Rinse lightly. This time, you want the dye to remain on all parts of the form. Set the form aside to dry thoroughly.

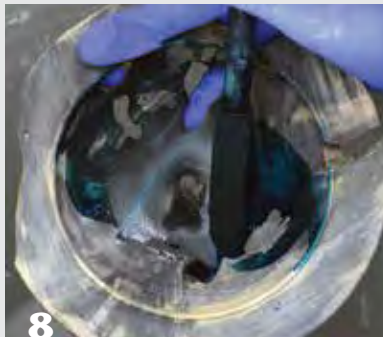
With the dyeing now complete, sand the dry form with non-woven abrasive to remove any raised grain. As before,

After first application



7 After the first application of dye, the piece will look blotchy. Note the difference in absorption of the black dye in varying parts of the wood, depending on grain structure.

Apply second color of dye



8 The author applies a second coat of dye, this time blue. Note the color change where the black was not absorbed into the grain.

take care not to sand through the dye. To avoid cutting through the dye and leaving bare wood at the edges, I use green or maroon non-woven abrasive (150 or 100 grit).

Adding depth

After applying your secondary color and allowing the piece to dry sufficiently, you can add a topcoat. Multiple light coats of a gloss wipe-on polyurethane will add visual depth. Plan ahead and determine how the piece will be held as the finish is applied and where it will sit while drying (*Photo 9*). With some forms, it may be necessary to apply each coat to one side and allow it to dry before applying finish to the second side. Gloved fingers will leave marks if the form is handled when the polyurethane is wet.

Exercise care in the material you use to apply the finish. Any lint on the applicator pad will transfer into the finish. Lint-free pads from an old tee shirt work well.

Apply three thin coats of gloss finish, allowing ample drying time between each coat, without cutting back the finish. After the third coat, smooth the surface with gray non-woven abrasive. The gray is equivalent to 220-grit sandpaper. It will smooth out any blemishes in the finish without cutting through to bare wood. Continue building up the finish with light coats of polyurethane. Do not be tempted to speed the process with heavy coats; runs and drips are time-consuming to remove.

Follow the drying time instructions specific to the finish you are using. Typically, I can apply two or three coats each day, but you may need to adjust expectations based on your local temperature and humidity. After the third coat and each coat thereafter, the finish should be smoothed with the gray abrasive and wiped clean before the next coat is applied.

Apply topcoat



After the dye has dried completely, several coats of polyurethane are applied to achieve a sense of depth in the finish. With each application, the work is set to dry on a nail plate, which leaves only minimal marks on the bottom.



As the polyurethane builds, blemishes in the finish can be leveled using 400-grit abrasive with a backing pad.

Remove any sanding residue by wiping with naphtha or mineral spirits before applying the next coat of polyurethane. Look for dull areas in the finish, which indicate where more build is needed. When all the dull areas are gone, the finish has sufficient build. Shallow blemishes in the finish will be filled as the topcoats build. Leveling the surface with 400-grit abrasive on a backing pad allows the polyurethane to build up in the low spots until it reaches the level of the surrounding surface (*Photo 10*).

After the eighth coat of finish, you might begin to question how many more coats are necessary. Be patient—you are building a finish for depth, and the result will be worthwhile. The number of coats required varies. I have used as few as eight and as many as twenty.

Once the surface has a uniform sheen, set the piece aside and allow the finish to cure for two days. The final step is to apply paste wax and buff. I load a white (extra-fine) non-woven abrasive with wax and rub across all surfaces. After the wax has dried, polish with a clean, soft cloth.

Conclusion

Water-based dye is an option that belongs in your toolbox of finishes.

It is appropriate when you want to avoid fumes inside your home or when you want to highlight the natural beauty of the wood's varying grain patterns.

Dennis Belcher retired from a 30-plus-year career in the investment world to his lifelong passion of working with wood. A member of the Wilmington Area Woodturners Association (North Carolina), Dennis demonstrates for clubs and participates in juried art shows. Contact Dennis at Dennis.M.Belcher@gmail.com or visit his website, DennisBelcher.com.

FOR FURTHER READING...

EXPLORE!

To find other articles and videos on using dyes to color your turned work, log on at woodturner.org and use the Explore! search tool.

Here are just two articles you'll find:

- "Show Your Colors," by Michael Allison, *AW* Spring 2007 (vol 22, no 1, page 30)
- "Dye and Liming Wax Finish," by Betty Scarpino, *AW* October 2016 (vol 31, no 5, page 18)

