Coloring Your World With Water Soluble Dye

Dennis Belcher

Lead picture #1

Lead Picture 2501 or 2504

Lead picture #2

Picture 2468 or 2467

All finishing techniques for turnings have strengths and weakness. Water soluble dying is a technique I have used for years because I could finish pieces during the winter months in my basement workshop. It's has a low odor so smells, and VOC's (Volatile Organic Compounds), don't drift from a basement workshop into your home. Since water is the solvent, it is not a fire hazard. It is transparent and does not hide the wood rather it enhances the complexity of the of wood itself. Finally, It is forgiving in its application without runs and lap marks. This coloring process builds upon an understanding of wood to enhance the character of the wood.

These are the attributes that attracted me to this technique years ago and are still valid today. But all finishing techniques have drawbacks.

he technique uses water soluble dye and each application of dye needs to dry overnight. As many as sixteen coats of a wipe on gloss polyurethane clear coat are used to create depth in the finish. Each finish coat needs 2 to 3 hours to dry. This means that the finishing process will take a week to 10 days from start to finish. It is not a lot of working time, just a lot of drying time.

The dye is powerful and splatters will color anything it touches, the floor, your shoes, socks, and pants. Wear old cloths and protect your floors.

Picture 2177
Caption – Dye is powerful and splatters easily. Guard your floor, walls, and choose your clothing with care.

Wood Selection

Wood selection and an understanding of the grain are keys to 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 absorbs less dye. End grain is very porous and dye will be absorbed far into the grain. This difference in the porosity creates beautiful, natural patterns. A successful finish rests on your understanding of the wood.

Picture – 2146 Cropped or 2146
Caption – This crotch maple bowl has the conflicted grain that makes it an excellent candidate for dying.

Transparent dye is absorbed into the wood and accentuates the conflicted grain found in curly maple, birds-eye maple, or crotch wood. The species of wood is not as important as the complexity of the grain patterns.

This technique can also be combined with carving patterns in straight grained wood. The dye will accuate the patterns because of the difference in absorption characteristics of end grain and side grain. See Side Bar

Preparing the Wood

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 begin to apply the dye. I can not stress enough that the gloss finish will highlight any flaws in your turning or sanding.

It is necessary to only sand to 220 grit. The wood will be soaked in water several times raising the grain and sanded again. Sand only to 220 grit at this stage.

Materials and Equipment Preparation

Picture – 2336 cropped or 2336
Caption – 5 gallon bucket, water, foam brushes, dye containers, pile of paper towels, gloves, and safety glasses

Aniline dye is generic term and there are many manufactures that use aniline when describing their product. Specifically look for a dye that uses water as a solvent, is lightfast, transparent, and formulated for wood. It is best to call the dye manufacturer and ask about the relative lightfastness of their product. Strong UV rays will cause color change. Lightfastness is a measure of how resistant finish is to sunlight. This will vary by manufacturer and by the color of the dye. You should require that the product you use have a high light fast rating.

Many dyes are dissolved in alcohol which requires a radically different application than water based dying. Alcohol dries rapidly before it penetrates into the grain.

A small amount of dye goes a long way. A teaspoon of dye mixed with 8 ounces of water yields several years supply of color. My practice is to mix the dye in plastic, or glass, containers with an airtight lids. Picture 2346. 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 additional dye and water to the container or simply add additional water if the dye has thickened.

Picture – 2346 cropped or 2346
Caption – Dye can come in packets or bottles. Mix and store the dye in airtight plastic or glass containers along with a foam brush for application.

Old clothes are a must. Clothes that will be reserved for dying and then thrown away. The dye is quite strong. A drop or two on your white socks will change the color of an entire load of laundry when the socks are washed. This is the voice of experience talking.

Protect the floor where you dye. The dye splatters easily and will stain concrete and anything it touches. The floor of my finishing room is covered with cardboard over a layer of tar paper. I wipe up any splatters or spills before it is stepped in. An alternative is to apply the dye outside in the yard over grass. Complete the dying outside and then bring the pieces inside to dry. Protect your hands with quality gloves. The dye is very difficult to remove from under your finger nails or off your skin.

A pile of fresh paper towels, several jugs of water, a five gallon bucket and safety glasses complete the necessary supplies. It is important that all the supplies be within easy reach. Once dye is on your gloves, you will stain anything touched.

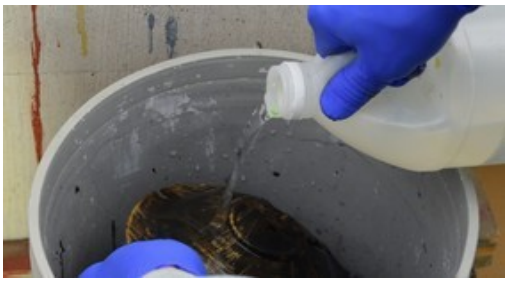
The Dying Process

Layering dye uses washes of two different colors of dye. Typically I use an application of black followed by a red or blue. Open grain will absorb the first coat of dye deeply into the wood. Where the wood is less porous, the dye is not absorbed as deeply. This difference in absorption results in a darker color where there the black is deeply absorbed and a lighter color where the black did not penetrate into the wood.

Picture – 2204 cropped, 2204
Caption – The first coat is black dye applied with a foam brush. Flood the surface allowing the dye to be absorbed into the open grain.

Hold your completed piece inside a five gallon bucket, and flood the surface using a foam brush. Picture 2204. Allow

the dye to be absorbed into the wood for a few minutes, then again hold it in the bucket and rinse it with clean water. Picture 2010 Remove as much of the black as we can. Take a paper towel and wipe all the faces soaking up as much of the black as you can. Rinse a second time and use fresh paper towels to blot up the water. 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 wash is applied.



Picture – 2010 cropped, 2010 or 2006
Caption – Rinse with clean water to wash away dye on the surface.

Picture – 2012 cropped, 2012 or 2014
Caption – Wipe off as much as you can of the black dye with clean paper towels. Rinse again and blot dry.

Allow the piece to fully dry. With the wood completely dry, 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 to raw wood. It is better to use non-woven abrasive on the edges.

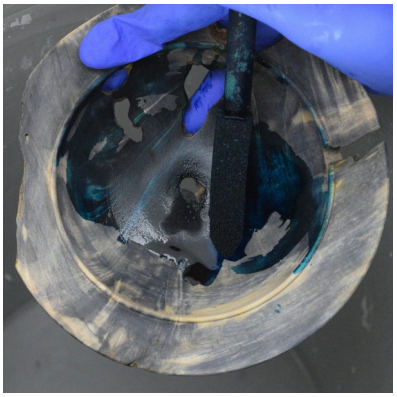
The sanding dust will color whatever it touches. I wear a mask to protect my lungs, safety glasses to protect my eyes and sand over an old towel to catch the dye dust. The towel is thrown away when the project is completed.

Picture – 2258 cropped, 2258 or 2250
Caption – Remove additional black by sanding with green non woven abrasive or abrasive mesh backed with a sanding pad.

Picture 2236 cropped, 2236
Caption – While the piece looks splotchy, look closely and note the difference in absorption of the black dye.

It is expected that the piece will look splotchy at this point. Picture 2236 Wipe off any sanding dust, empty your 5 gallon bucket and replenish your fresh water supply. The second wash of dye is now ready to be applied.

With your piece again inside the bucket, flood on the second coat of dye covering the form until it is saturated. Rinse lightly. We want the dye to remain on all parts of the form. Set the form aside to dry thoroughly.



Picture – 2269 cropped or 2269
Caption – Applying the second coat of dye. Note the color change where the black was not absorbed into the grain.

With the dying now completed, sand the dry form with non-woven abrasive to remove any raised grain. Be careful not to sand through the dye. Sandpaper risks cutting through the dye leaving bare wood on the edges. Avoid this problem by using green or maroon non-woven abrasive (150 or 100 grit).

Wear a mask to protect your lungs, safety glasses for your eyes and gloves to keep from staining your hands.

Adding Depth to the Finish

After applying your secondary color and allowing sufficient drying time, the finishing process can begin. Depth and gloss is added to the finish with multiple light coats of a wipe on polyurethane gloss finish. Plan ahead and determine how the piece will be held as the finish is applied and where it will

sit while drying. With some forms it is 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.

Picture 2340
Caption - The bowl is set to dry on a nail plate after applying a coat of finish. The nail plates leave only minor marks on the bottom.

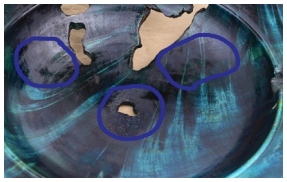
Exercise care in the material that you use to apply the finish. Any lint on the applicator pad will transfer into the finish. Lint free pads from an old tee shirt work well.

Apply three thin coats of gloss finish, allowing 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 a 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. Do not be tempted to speed the process with heavy coats. Heavy coats will run and drips are time consuming to remove.

Follow the drying time instructions specific to the wipe on polyurethane that you use. Normally I am able to apply two to three coats of finish each day. Adjust the drying time to reflect the temperature and humidity as needed. 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.

Remove any sanding residue by wiping with naphtha or mineral spirits before applying the next coat of polyurethane.

Picture- 2307 Circles added, or 2307
Caption – Note the circled dull areas. When the all the dull areas are gone, the piece has sufficient build.



Shallow blemishes in the wood will be filled as the finish coat builds. Leveling the surface with 400 grit abrasive on a backing pad around the blemish allows the poly to build up in the low spots until it reaches the level of the surrounding surface and it no longer visible.

Pictures 2312 cropped, or 2312
Caption – As the finish builds blemishes can be leveled out with 400 grit abrasive with a backing pad.

At the eighth coat mark, you will begin to question how many more coats are necessary. Be patient, your finish is building and you will be pleased. The number of coats required is a variable. I have used as few as eight coats and as many as twenty. Look closely for spots that are not shiny. Continue to apply coats until you can not find any dull spots. Generally this occurs between the 8^{h} and 16th coats. The exact number of coats will

vary depending upon the wood and how many times you have to apply one more coat to remove sanding marks.

Once the surface has a uniform sheen to it, set it aside and allow the finish to cure for two days. The final step is to apply a hard paste wax and buff. I load a white (extra fine) non-woven abrasive with wax and rub across all sides. After the wax has dried, polish with a clean, soft cloth. Power buffing the surface is also appropriate, but be careful not to cut through the finish.

Picture *2451*
Caption – After the finish has fully cured, apply wax with a very fine grit of non woven abrasive and buff.

Conclusion

Water based dye is a finishing technique that belongs in your toolbox of finishes. It is a finish that is appropriate when you want to avoid fumes inside your home or projects where a high sheen is desired. It builds on an understanding of the wood grain and highlights the natural beauty of wood in a spectacular manner.

Dennis Belcher retired from a 30+ 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.

Side Bar Start…….

Dye layering is normally associated with highly figured woods as shown in Picture SSC-0019 and Picture 2430-1. However, that is not it's only use. The small size of dye particles means that it will penetrate deeply into end grain. In a live tree, water and nutrients travel from the roots up to the leaves through the end grain of the tree. That is the natural path for water to follow and water soluble dye follows the same path. Side grain does not have this natural path. This characteristic can be used with plain wood to achieve color change across the piece.

Picture 2482, or 2487, or 2488
Dye highlights the crotch wood and knot in this piece of river birch.

Picture 2475
Caption – Curly maple is an excellent wood for dye layering.

Picture 2467 or 2468, 2462
Caption – The shell pattern carved into this piece of plain hard maple is accented with dye layering.

Picture 2467 is a vertical flower disk make from hard maple dyed with black and then red. Notice how the hue changes across the face. Where end grain is exposed on the edges, the black interacts with the red changing the hue to a much darker color. Carving patterns on the face of the disk increase the amount of end grain exposed. This creates a marvelous color change across the disk.

Picture DSN2159-0038
Caption – A graduated color change will occur with dye as the wood changes from end grain to side grain.

End grain / side grain can also be used to achieve graduated color change across a curved form. Picture DSN2159-0038 has a color change as the eye travels up the sidewalls. As the wall transitions from end grain to side grain, there is less black and red color mixing. The gradual color shift follows from the curve chosen as the bowl is turned. Gradient color can also be achieve by the skilled use of an airbrush. The use of an airbrush is an entirely different learning curve.

Picture DSN 2338-Catenary
Caption – The gradual shift of color from red to black at the base of this hollow form of curly maple is another example of gradient color from end grain to side grain.

Picture DSN 2338-Catenary is another example of using end grain to side grain to add color complexity. This catenary form uses dye layering with curly maple. With the straighter walls at the top of the hollow form the darker hue is only present where the grain has curl, but as the form curves in to the bottom, more end grain is exposed resulting in a color change from red to black.

Picture 2435-1
Caption- Dye layering adds further complexity to the colors in this vase.

Picture 2435-1 combines two uses of dye layering. The curves of the form are used to creat gradient color at the top and very bottom of the hollow form. The black dye stays in the valleys of the carving through the sanding process adding further complexity to the color change in the form.

Side Bar End …...