

# Finishing for turnings

This month, **Kurt Hertzog** talks about epoxy and the correct way to use as a finish for your turning projects

## KURT HERTZOG



Kurt is a professional woodturner, demonstrator and teacher and writes for various woodturning and woodworking publications in the United States as well as contributing to *Woodturning* magazine. He is on the Pen Makers' Guild Council and is past president of the American Association of Woodturners (AAW).

kurt@kurthertzog.com  
www.kurthertzog.com

When you think about finishes for turnings a couple of things immediately come to mind. How good does that particular finish look? Is it durable enough for the application? If so, is the piece worth the effort to put that finish on? If the turning is going for sale at the craft fair never to be seen again then perhaps the rub and buff finish is your choice. A turning that may stay in the family or go to a special customer or friend might deserve more attention. Nearly all finishes look good if it's properly applied after having done the necessary preparations. Every finish from beeswax and turpentine through catalysed lacquers will add value to the final piece.

When you think about durability, you can often run into several issues. Is it durable enough to stay looking good for a lifetime of use? Is that lifetime the next few years or handed down to the next generation? Who will be using it, how often, and how 'gently' can also enter the picture. For example, will your bowl sit on the dining room table holding fruit for the rest of its life? Will it be used by kids and their friends for snacks and popcorn at sleepovers? Of course, repairability certainly enters the picture. Should the finish take a beating and be in need of repairs or 'refreshing'? Does the finish you've chosen lend itself to repairs or refreshing? For the most part,

ease of application depends on your skills and familiarity with that finish. Obviously, equipment and frequency of use plays a part. Few of us have dedicated spray booths, specialised filtering hoods, breathing apparatus and the ecologically correct disposal of chemicals that are part of the professional level finishes. Sticking with the more common finishes available to most of us and one that's not used as much as it probably should is epoxy. While I personally am a fan of CA or lacquer as a finish for nearly all of my turnings, epoxy does play a part in my finishing repertoire. This month, we'll look at things you need to know about using epoxy as a finish.

## DO'S AND DON'TS

- Don't skimp on surface prep as surface flaws will not be hidden, only highlighted
- Get everything ready prior; all supplies, PPE and cleanup materials
- Have a clean, dust free work area whether a fixture, table or lathe
- Always mix the epoxy components thoroughly. They need it to work correctly
- Work in a room temperature environment until you're more experienced
- Practice and master the process on unimportant practice pieces
- Use a standard, readily available brand. Settle on one and master it
- When you begin to get to the gel point, quit! Don't make a mess trying to fight it
- Do not try to alter the cure times by varying the ratios of hardener to resin
- Never play chemist adding to the formula. Mix and use as only as directed
- Do not sand too early and wait until the epoxy has cured to solid

## Safety

Epoxy adhesives don't require extensive considerations to use but adequate ventilation, eye and face protection, breathing protection when sanding, and using hand protection when needed are wise to have. Never be afraid to read and heed the manufacturers instructions. The label of every consumer package will have the recommended safe usage includes any PPE that's been suggested to use. Avoiding direct skin contact by using nitrile gloves or equivalent can help prevent or delay you from being sensitised to the active ingredients. Also be aware that other people may be sensitised to the chemical constituents of epoxy. While you may not be affected, there may be others nearby or in the same space that can experience some issues. It is wise to check on this prior to

opening, mixing or using any chemicals. You may hear or read about altering epoxies open time with the use of acetone or other chemicals. Blend and use epoxies as the manufacturer recommends and do not begin playing chemist. The manufacturer will offer varying cure time products or altered hardeners if appropriate. If they offer it and it fits your needs then use it. Do not try to concoct your own. Likewise, you'll see those trying to heat the epoxy to change the viscosity or alter the cure time. Please be cautious and do this safely. A heat gun set to warm will give you the desired benefit. When I see the online materials with people using a match or torch to heat an epoxy coated turning, I shudder! An open flame of any kind has no place among the dust and debris in my woodshop.



A heat gun set to warm kept well away from the turning can lower the viscosity for penetration as well as accelerate the curing

## Advantages

Epoxy is one of the more friendly chemicals used in the shop. It isn't as noxious as some of the adhesives and finishes we often use. As a two part product, it stores well without the issues of oxidation and hardening in the container. The vendors of the product have made metering and mixing easy. While an advantage and potentially a disadvantage, epoxy has gap filling characteristics. When using as an adhesive, a 'plug' or flaw filling agent, gap filling is a great advantage. When using as a finish, care must be taken to avoid filling of crisp details in the work. Depending on the vendor, you can control the mixed product characteristics by using different hardeners and retarder agents. You can find out more about epoxies in 'What you need to know about using adhesives' published in

WT 269, August 2014. An epoxy finish has many advantages. The most obvious is its toughness and durability. Once cured, epoxy is very resilient to the dings and dents of everyday life and epoxy tends not to get brittle with age. It isn't bullet proof, but certainly protects the wood especially when it is been built up with multiple coats. It is modestly priced and readily available and you can colour epoxy from a very light tinting to a solid colour if you wish. The solid colour technique isn't used often for a complete surface finish, but is great for gap filling or special accents. Tinting is easily done by mixing your dyes with the epoxy when mixing the two epoxy components. Be aware that you may have a problem matching tints or colours if you need to mix multiple batches.



TransTint is just one of your choices for colouring your wood before finishing or tinting the epoxy then finishing



The colour palette is quite extensive especially considering you can mix any of the colours together



I've used the five minute structural epoxies for finishing but they are more suited to small items because of their viscous nature



The two laminating epoxies I've used work well on any size turning having a reduced viscosity and controllable open times

## Selection

There are many products offered in the marketplace for finishing ranging from wipe on to bar top coatings. The available epoxies range from the five minute bubble package products at the home repair centre to professional grade products with assorted hardeners and retarders. Nearly any of these can be made to work although some are far easier to use. You'll need to consider the open time, gel time and cure time of the product you select. Be certain you've selected a product that will let you apply and work the epoxy as needed before it begins to gel in the curing process. The size of your turning will be a factor. Mixing and applying epoxy to a small, lidded box will be far quicker than working with a large platter. There are a variety of methods to apply epoxy as a finish.

While I have experimented with the various brands from the major manufacturers, I learned epoxy as a finish from Giles Gilson using West System's epoxy. Having been successful with it, I have made it my standard when using epoxy as a filling agent or finishing material. There are other choices for you in the market. The two that I can highly recommend from experience are the West Systems Epoxy and the System 3 Clear Coat. Both fall into the more professional levels than the bubble pack materials in the home centre. Not necessarily much more expensive per unit volume when you buy in quantity. They both offer optional chemicals for altering open and cure time. However, they are not sold in the small quantity packaging as are the home centre epoxies.

## Knowing what happens

Understanding a bit of what happens will help you with your selection and use of epoxy. Two part epoxy contains a resin and hardener. Most consumer bubble package epoxies are designed to be an equal 1:1 mix of resin and hardener. Others specifically a finish or professional market may differ and will specify in their mixing ratio requirements. At room temperature, mixing the dispensed parts of the two constituents will begin the curing process. Once mixed well, the resulting liquid can be easily applied or spread. This liquid use time is usually called 'open time' and can also be noted as working time or wet lay up time. Temperature dependent, the manufacturer usually specifies this time at a room temperature of 70°. Get everything done you need to during this time and apply it where needed, fasten and clamp things, or get your coating spread. The liquid or open

time passes into the gel time. In the gel phase, epoxy tacks up and becomes unworkable from a practical standpoint. It isn't fully cured, but it is part way there. If additional epoxy is added to this gel stage epoxy, there can be a chemical bond between the original and added layer. It is the transition between the liquid and the final cure solid. If not called out on the spec sheets, you can assume the gel time to be the difference between the open time and the cure time. While in the gel state, especially early on, a thumbnail can create a dent in the epoxy. Spec sheets will quote the cure time. At the solid or cure state time, the epoxy has reached about 90% of the strength it will ever obtain. A thumbnail won't make a mark and the epoxy can be sanded and shaped as needed. Any added epoxy at this point will be a purely a mechanical bond. To achieve good adhesion between added layers, the cured surface needs



A couple of work area savors are a high temp silicone baking mat or parchment paper. Both are chemical and heat resistant

to be abraded to provide tooth for the next layer of epoxy. Be aware that it takes many days beyond the specified cure time to get to the final cure properties. That 90% to 100% completion really isn't of any consequence to us, but know that it does occur and slowly.

## Epoxy and temperature

Epoxy and the chemical process of curing is temperature dependent. Once the two parts are mixed, the epoxy begins the process of cross-linking. It exotherms meaning it gives off heat. This heat generation helps cure the product since the higher temperature helps speed things up. The contrary is true, if you work in a cooler environment the curing process will be slowed. The limit is given on the labels and varies by brand, but the recommended usage temperature range for most epoxy brands, is in the range of mid 90s down to the low 40s. Elevated temperature speeds things and reducing temperatures slows things down. If you stay within reason, you can use this to your advantage from a time standpoint. In a hurry? Warmer temperatures will shorten the needed time. Need more open time? Cooler

temperatures can help. The increased open time based on temperature does come with some downsides. At cooler temperatures, epoxy is more difficult to mix and mix well. Also, when using it as a coating such as our application as a finish, it doesn't flow out as well being colder. These tradeoffs may not work to your advantage so I recommend you stay in the room temperature range until you get beyond the basics. We'll take advantage of the flow improvements by warming with a heat gun before the epoxy coating has gelled. Warming applied epoxy carries the risk of lowering the viscosity too much and causing sags. We'll still need to be cautious to keep the temperature of mixed epoxy below the recommended maximum of 120°.

## Proper preparation of the surfaces

There is no clear finish that I'm aware of when it's applied that will cover up poor preparation for finish. You certainly will want the shapes and features of your work defined and sanded, but what about the areas that were easier to cut? Depending on the location and finish applied, wide open areas or difficult to examine areas will have scratches that will show up after finishing. Like all finishes, scratches underneath can't be fixed

without removing the finish and fixing the underlying problem. Careful examination of the prepared surface is a very wise investment in time. Sanding, whether power or hand, needs to be done with the care using good technique, cleaning between grits, and working through the grits. It is important to use the intermediate grits when needed. What grit should you work to? That depends on the species and the design. Sand until you

get to the point where you are happy with the appearance of the surface finish. If you can see scratches, the final user can see them right through your epoxy finish too. One caution about sanding to too fine of a grit. Epoxy requires a bit of tooth to bond well to the surface. Though not required, I do a thorough cleaning of the surface with a paper towel soaked with denatured alcohol, which removes any of the dust and debris left from sanding.



Epoxy will fill gaps and voids, but never cover a poor job of surface preparation



Whether high priced or bargain basement, flexible high intensity LED lights are handy accessories for checking surface flaws



The flexible snout lets you lay flat on surfaces, bottoms of bowls, or difficult to reach areas



This image, taken in daylight, but set to show the effects of the light illustrates how you'll see things you'd otherwise miss

## Applying Epoxy

The method I learned from the late Giles Gilson was as follows: you apply the epoxy in a wipe on and then wipe off technique. You can work anywhere you are comfortable and have the needed ventilation and PPE. I tend to work right at the lathe using the lathe itself as a work holding device. I mix my epoxy per the instructions with at least enough for the intended coating having all else in ready. My application tool is a folded paper towel. Wearing nitrile gloves prevents bare skin contact with the epoxy. Loading up a folded paper towel and using it to rub the epoxy on to the turning while rotating the lathe by hand to do complete coverage. Once the turning has complete coverage including all of the nooks and crannies, I use a clean paper towel to wipe it off. Change towels as often as necessary to get the turning free of excess epoxy. If you want to be certain to flow into any tight spaces, use a heat gun on low heat to blow warm air over the epoxy. You'll see the viscosity change in any areas



The layup epoxies, West Systems, System 3, or equivalents can be brushed on, applied with rollers, or by hand with a towel



Sanding between coats with 330 to provide tooth for the next coat. If you don't get white dust, you haven't let it cure enough

where there is a fillet or residue that couldn't be reached during the wipe off. The epoxy is then allowed to cure. If you need the lathe, take the chuck, faceplate, or other mounting apparatus off and place the turning in a dust free environment to cure. After 24 hours, if you want another coat of build, remount, abrade the surface to provide some tooth, clean it, and repeat. Like CA, it is a

progressive build process until you get to the thickness or look that you want. That can be one coat or 15. Your choice. Applied sparingly and wiped off properly, you will not have to do any leveling of the coats. If for whatever reason you wind up with unevenness, you'll have to sand as needed to level the surface. Most of the time, a couple of coats are more than sufficient.

## Final finish

With sufficient build to your satisfaction, all that is left is the 'rub out'. Nothing more than the final light sanding with fine grit abrasive to smooth the finish to a mirror feel and look. I usually use Micromesh starting half way through the stack. Somewhere around 3200 on the Micromesh scale and working to the finest. You can bring the epoxy finish to the same sheen as a lacquer if you wish. Also, four ought steel wool will matte back the finish for that rustic look. If you have the need, you can always put a bit of wax over the top in either case. I like the Renaissance Wax as an aid to keep fingerprints down. You can use your favourite or just leave as is.



Once at the final coat, 1 or a number of them, a final sanding through the Micromesh will smooth and shine to a gloss if desired

## A finish or substrate?

You've heard that you can't seal wood to prevent moisture absorption. Epoxy has been used for many years to build and seal boats. Does it do it perfectly? Is an epoxy finish waterproof? I don't know, but it is as close as we'll probably come. Giles Gilson spent enormous time creating his airbrushed masterpieces on turned vessels. His epoxy finishes were applied and perfected to provide a stable substrate for his paintings. From inches to many feet in size, his works of candy coloured lacquer airbrush scenes have existed for nearly 50 years without flexing enough to cause damage.



A candy color lacquer over epoxy by Giles Gilson



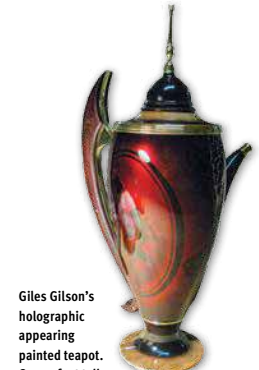
Movement of any kind would destroy the candy coloured lacquer airbrushing on this piece. A Giles Gilson turned and air brushed piece



As a substrate for painting, the epoxy surface finish must be flawless and as inert as possible. A Giles Gilson turned and air brushed piece



An early Gilson piece with the super high gloss lacquer painted surface



Giles Gilson's holographic appearing painted teapot. Over 2 feet tall

## Conclusion

While epoxy certainly doesn't sound as exciting or high tech as catalysed lacquer, it is far more likely that the home shop user can get, apply, and be successful with it. You can apply the tough, smooth finish to protect your turning or to create a virtually inert substrate over the top of your turning for subsequent decoration. Either way, epoxy can fill the bill. Like all of my columns, this isn't the end point, but rather the starting point. You won't master epoxy finishes just by reading this column. You have sufficient accurate and helpful information to begin your journey using epoxy as a finish for your work. You'll certainly need to experiment and practise developing your own techniques with whichever brand of epoxy you use. Don't try to use them all. Experiment as needed and then pick one that best suits you and master it. It may or may not be the same brand you use as a fastening adhesive. Using epoxy as a finish when appropriate will serve you well and you don't need many to choose from, but I suggest that epoxy be a tool you add to your repertoire. ●



Epoxy as finish is easily done and looks spectacular. Add it to your arsenal of finishes