What you need to know about inlays

In the next part of his new series, Kurt Hertzog looks at the various things to consider when you decide to integrate an inlay into your turning.

**SAFETY FIRST**

Just like turning, creating your inlay can range from your cutting of the inlay materials to preparing the areas for the inlay to reside. That said, eyewear and dust protection are always in order. We’ll be exploring casting in a future column, but for now, proper ventilation and protective gloves for the chemicals and adhesives are certainly wise. Depending on your selection of tools for creating inlay areas, power cutting or carving protective gear, such as leather aprons or Kevlar gloves are in order.

**INLAYING WOOD INTO WOOD**

Segmented turners learn to understand wood in a hurry. Because they use different species for their colourations, they are forced to deal with the corresponding expansion rates. If you don’t understand the three different expansion directions and rates, visit your club library to review the topic in Bruce Hoadley’s book *Understanding Wood*. Failing to understand and heed this will cause you problems pretty quickly. The method to reduce this problem is to avoid the multiple-species problem. Also, inserting the bottom as a floating plug can work. When working with dissimilar species, allow for the varying rates of expansion and contraction. Don’t cross grains between the turning and the inlay. Keep the grain orientation the same to minimise stress in the inlay and adhesive bond. One of the beauties of burl is that it has no grain orientation to speak of. Inlaying burl for a cover will tend to cause less problems. Another method of inlaying wood into wood is to make it a component. Often a contrasting species is used for the rim or other detail. Because the species are chosen for their colours, you still need to be cautious of expansion rates and grain orientation.

The base of the lidded box below was turned and an inset was glued in to provide the rim. Turned to become the rim for the top, it can be done for colour selection or threadability. The contrast can be a striking feature and turned as part of the process makes everything flow together nicely. This is not extremely common, but inlaying end grain cuts is gaining popularity. The ability to dye materials and create striking looks is almost endless. Because the inlay is extremely thin and impregnated with the...
INLAYING WOOD INTO WOOD (CONT.)

Epoxy adhesive, it is very tough and durable. The channels for the inlay can be cut on the lathe with a parting tool, or even done with a router and circle cutting attachment. The process for the edge treatment is cutting the end grain slivers with a die-cutter. That allows for replication of any patterns that are created as desired later on. However, nothing prevents you from inlaying any other material as a rim treatment. The depth of rim channel might be different but you certainly can inlay colours, stone, metal, or other inlay materials.

**KEY POINTS TO REMEMBER:**

1. Consider the expansion coefficients for compatibility.
2. Orientate the grain to prevent excessive mismatch.
3. Use wood glue when possible for face grain to face grain bonds.
4. Use CA to work into tight fits when needed, being aware of brittleness.
5. Use epoxy when suited to allow for flexibility of adhesive.
6. Cut pockets with turning or woodworking tools based on shape/ location.
7. The insert can be created, traced onto the desired location and then the field can be prepared with woodworking techniques.
8. For flat surfaces, a depth controlled Dremel or equivalent with a mini router bit works nicely.
9. Leave ‘breathing room’ where possible to prevent breakage.
10. Turn and finish with normal tools and finishes.

**INLAYING COLOURED ADHESIVES INTO WOOD (CONT.)**

While the title says ‘inlaying coloured adhesives’, don’t make it too restrictive. It really means anything soft and pliable that can be put into a cutout or recess to cure. I like to use epoxies to solve problem areas because they will fill nicely and take colour readily. Take this idea and run with it! Drill holes in bowls. Put numbers in clock faces. Put numbers in the centres or just sanded with an orbital sander.

Did you ever wonder what happened to all of the wasted materials from the laser cutout stock? Called ‘laser leftovers’, they are becoming popular with pen turners.

Some epoxy adhesive with acrylic paint colouring makes for a problem-free bottom for a segmented platter. No points to match, no end grain problems in the bottom and no expansion problems.

The intensity of the colour can be controlled by the density of the wood dust in the adhesive. Mix in more dust as needed.

**KEY POINTS TO REMEMBER:**

1. Test your colourants and adhesives prior to a critical application.
2. The cure time varies based on the filler and the ratio.
3. Five-minute cure time is a misnomer, 24 hours to strength unadulterated.
4. Multiple partial fillings may be better suited to deep cavities.
5. Mix as needed mind the open time to avoid waste.
6. Don’t rely on the adhesive for original bonding strength after colouring without testing, colourants may reduce original properties.
7. Use any of your woodworking or woodworking tools and techniques to create pockets for filling, through or partial will work.
8. Your lathe makes a wonderful, indestructible, locking workholder.
9. You can create ‘free-form’ fields for filling with carving tools, Dremel tools, drills, saws, or other wood removing tools.
10. Don’t be afraid to experiment although don’t do it on a time critical or expensive project. Experiment on practice pieces of the same material. Here glitter is being used as filler for sparkle.

After the epoxy cures, it turns just like plastic. Use your standard woodturning tools and techniques to cut and shape as desired. Sanding and finishing is also the same as usual.

Examples filled with acrylic paints, sparkles, ground turquoise stone, mica sheet’s colourants, paint pigments, and more. Experiment when you have time to see where you can take it.

**TECHNICAL How to do that**
STONE AND METAL POWDERS

You probably have seen enough bowls with cracks or rim treatments done in turquoise to last a lifetime. I won’t belabour it here, but I will cover the methodology so you’ll know how to work with stone and metals. Depending on your planned application, you can buy crushed stone, different sized metal powders, or other solid fillers to inlay. If you want a radial type feature, you can cut it with your turning tools. Other shapes can be carved in with hand carving tools, power carving tools, drills, saw blades and more. The goal is the creation of a pocket to deposit your particles of filler, before hardening them in place. The aspect ratio of the cut or created channels do need to be reasonable, or there is a likelihood of material separation over time. When the channel or pocket is prepared, the granules of stone or metal is deposited and hardened in place with very thin CA adhesive.

Use something to catch spilled materials for reuse, as both crushed stone and metal powders are in the range of £4.80 to £10.20 per ounce. Work only in a portion of the curve, filling the channels with particles. Work in partial rotations, hardening the particles with the CA adhesive. The very thin is used to be certain it will wick through the particles uniformly to the bottom of the pocket. Standard viscosity and thin may not work with the finer powders. Purchase the very thin CA for this type of application. Once the application of adhesive has hardened all of the deposited particles, the turning can be accomplished. Standard woodturning tools will work, but will dull very quickly. Carbide cutter tools used in a scraping mode will remove the stone down to the surface where you take over with abrasives. Metal powders can be cut well with standard HSS steel tools in a normal cutting orientation.

KEY POINTS TO REMEMBER:

1. Create your pockets or channels using your favourite woodturning or woodworking tools but keep the aspect ratio reasonable.
2. Straight side walls will fill easily, yet provide good retention. Avoid ‘V’ style shapes if possible.
3. Use very thin CA adhesive for your bonding agent. Standard thin may not wick to bottom when using finer particle materials.
4. Accelerator can be used sparingly.
5. Carbide cutters work best for stone in a scraping attitude. HSS in normal cutting manner for metal powders.
6. Be cautious when sanding as there will be a big difference in sanding rates between stone or metal and the surrounding wood.
7. Wear appropriate PPE! Cutting stone and metal inlay can create dust and debris hazardous to eyes and lungs.

These examples are just a few of the crushed stone fillers that are available. Depending on the material and application, you may need different size particles.

A pocket to receive the dry particles is created in one of a variety of ways. Here the parting tool is used to create parallel channels to be filled with turquoise.

An artist’s palette knife works nicely to deposit the granules into the channel on the top of the turning. Use a catch paper on the bed to recover the costly powders spilled.

The stone or metal powder is turned to flush and then completed with abrasives. Once the turning is completed, finish as normal. Here is a mahogany lidded box with a turquoise inlay.

Dispense very thin CA adhesive to solidify the granules in place. Leave a working area without adhesive to continue after rotating for the next area.

Clip the wire close to the surface and then bond in place using thin CA adhesive. The small clearance will wick in the CA and cure quickly.

Drill your desired holes with only about a 0.06mm clearance. This will allow sufficient adhesive to be wicked into place.

PRECIOUS METALS

Often there is a desire to accent turnings with precious metals. We’ll avoid the gold leafing here, but will cover the inlay of silver wire. The technique works for gold wire as well as any standard wire, as long as it is very soft. Usually the wire is inlaid into a drilled hole. I’ve never seen it inlaid into a channel as is done in engraving adornments in metal. Most likely, because of the parent material sidewall characteristics of wood. For our example, we’ll use silver wire. Silver wire is available through the jewellery supply houses. You specify the metal, purity and diameter. They will sell it to you based on the daily spot market price for the metal you are buying. When you receive the wire, gauge the diameter so you can select a drill with only sufficient clearance for the adhesive to wick by. Drill your holes in the wood where you would like them. In turnings with a hollow beneath, try not drill all the way though as you’ll waste wire if you don’t bottom out. You do need to have sufficient depth to accept the wire and bond in place. Insert the wire to bottom out or, if a through hole only project, minimally on the inside. Clip the wire close to the surface with a pair of diagonal cutters. Jeweller’s size and grade work far better than those from the garage. While you can apply adhesive one at a time as you cut, I find it easier to apply CA to them all at once. Standard thin CA will work well providing the hole is a reasonable fit. I allow about 0.06mm diameter difference. Once cured, use a file to remove the metal down to flush. DO NOT try to use woodturning tools. You will never be successful getting them all cut flush without pulling some of them out of the hole. File them flush and then move to abrasives for sanding and finishing.

KEY POINTS TO REMEMBER:

1. Don’t insert precious metal until all of the turning, shaping and rough sanding has been done.
2. Drill holes sized 0.06mm over the actual wire size.
3. Go to a reasonable depth to allow for maximum retention of the wire. This is reasonable based on how little is used.
4. Insert wire and clip with electronic or jeweller’s diagonal cutters. Avoid the large bulky automotive grade cutters.
5. Use standard thin CA to bond the wire into the holes.
6. Sand sparingly as the two materials will sand at different rates. Even soft, the silver or other metal will sand differently than the wood.
7. Experiment with silver, brass, bronze, aluminium and other soft metals.

TOOLS

For the most part, everything done with inlay can be done with your woodturning tools or the common workshop tools such as saws, files, rotary tools, etc. You can certainly bring your carving tools, power carving equipment, laser cutters and anything else you have access to or service you can purchase. The two tools that I find very helpful when cleaning a field on a flat or slightly rounded surface are the Dremel base with either the Dremel tool or the flex shaft. This allows for view when cutting out a traced pattern as well as for a flat bottom or uniformly deep pocket. An alternative to the Dremel is a die grinder in a luther’s base. Used by instrument makers to cut channels for purfling, it is much easier to control and has better adjustability controls.

“An alternative to the Dremel is a die grinder in a luther’s base”

File until flush and then move to abrasives. All of the turning and rough sanding is done prior to precious metal addition so final finish sanding is all that is required.
A collaborative effort of pen and presentation case for a friend's 50th birthday. An example to plant seeds for ideas.

A simple desk dip pen that has a bit of uniqueness. Another thought starter to get your own creative juices flowing.

The case could be made that casting polyester resin is inlaying. I don’t think I’d dispute that. The topic is so massive that it will need to be dealt with in another column. The opportunities there are boundless for application to woodturning. While it is commonly applied to pen turning and the examples I’ll show are pens, don’t think for a moment that there aren’t far reaching applications for the entire spectrum of woodturning. Not only can you cast just about anything inside the resin but it launches us into putting pictures, cloth, and other items into our turnings. It is a plastic and what can’t you encapsulate in plastic? Might it be your breakfast cereal, your daughter’s pompoms, dyed rice, or party toothpicks. Perhaps a snake or snakeskin. Start thinking about it. It won’t be long in coming. We’ll do an entire section on casting in one of the upcoming articles, so get ready.

With the ability to cast, all fillers are fair game. Breakfast cereals, party toothpicks, remembrances and even snakeskin.

Cutting mother of pearl, abalone shell and ablam to your desired shape is another facet of inlay. Preparing the field to inlay it is also a challenge, particularly with inside and outside connected script.

With the ability to encapsulate photos and other items in plastic, you’ll have the ability to turn items that have a personal aspect. Not a photo but a snakeskin under the resin.

Here’s what the snakeskin looks like when done up properly. When you venture into casting, you’ll have another opportunity to take your inlaying ability to new levels.