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## Working with Corian®

by Kurt Hertzog

As a turner, you may want to experiment with materials other than wood. There are materials that offer their own unique characteristics, alone or in combination with wood. One of the materials that I have enjoyed using is Corian®. Corian® is isotropic, relatively inert, colored throughout, and very dense. There are other manufacturers of similar solid surface materials, but my experience to date has been exclusively with DuPont's Corian®. I'll give you some suggestions on locating, preparing, turning, and finishing this material.

Depending on where you live, you may be able to get Corian® free for the asking or have to pay a pretty hefty price for it. This material has been made and used for countertops for many years. There may be countertop fabricators in your area throwing their scraps and cutouts into their dumpster. A friendly conversation with the shop owner (along with a turned gift made of Corian® perhaps) often will often yield a source of free or modestly priced Corian®. If you can't find a free local source for the material, there are shops that will sell their scraps. It is always available for a price via EBay and other Internet sites. The problem with shipping Corian® is that it is extremely heavy. Shipping costs can often be higher than your material purchase costs. DuPont has one authorized Corian® outlet for "artistic" uses. Art Specialties International, located in Lancaster NY, can buy from DuPont and resell the entire Corian® product line as long as it's end use is anything other than countertops. Do a Google search for them to find their website.

Produced mainly as a countertop material, Corian® is available in ¼, ½, and ¾ inch thick sheet form. The product line has a wide array of available colors in ½ inch thickness. A limited color selection is produced in the other sheet thicknesses. The key point is your material is probably going to be ½ inch thick pieces of stock, whether sheet or scrap pieces cut from sheet. For most applications, you'll want to bond Corian® to another material or to itself to produce thicker pieces.

To bond Corian® to wood, I use 5 minute Epoxy glue. I make sure both surfaces are clean and flat. I sand and clean the Corian® bonding surface (as explained later) before gluing and clamping. After curing overnight, it's ready for use. While it is called 5 minute Epoxy, it doesn't develop it full bond strength for many hours. I usually let it cure for a minimum of overnight. Depending on the maker, formulation, and ambient conditions, it can take a day or more to develop full strength. Bonding Corian® to Corian® to make thicker or multi-color pieces can be done using the DuPont approved adhesive. This special two-part material is very expensive and has a very limited working time once mixed. While it will yield a superbly bonded joint between pieces, the price and availability puts it beyond the range of most of us. Over the years, I've seen and experimented with a variety of alternate bonding techniques for Corian®. Some work better than others. The one I'll describe here is the most workable and reliable for me.

As produced, Corian® has a highly finished side and a relatively unfinished side. I find that reliably bonding this material to itself requires almost drill block flatness between gluing surfaces. To bond Corian® to Corian®, I glue the finished side to finished side using medium viscosity Cyanoacrylate glue. The process I use is as follows. Sand the finish sides of both pieces to be joined flat. I do this by putting a piece of 400 grit sandpaper on my table saw top (or any surface you know is flat and rigid) and sand the pieces on the sheet of

sandpaper. Once they are sanded flat, I clean the two gluing surfaces with denatured alcohol to remove any sanding dust, grease, or oils. Hold the pieces by the edges during and after cleaning to prevent leaving your hand oils on the gluing surfaces. After cleaning, you can look at these surfaces in an oblique light to see any imperfections that require further attention. Once you are content that both pieces will have flat, intimate contact across the entire glued surface and are clean, you're ready to glue.

You'll have very little working time during the gluing process so get everything ready that you'll need ahead of time. I use medium viscosity Ca glue to bond the pieces together. With the cleaned surfaces facing up, spread Ca glue over the ENTIRE surface to be bonded of both pieces. The goal is to have complete coverage across the entire surface. I put down lines of Ca and spread it using the long sides of a craft stick. This could be accomplished with a stiff piece of plastic or other expendable stiff card. The thickness of the glue can be as thin as you can easily get. It needs to be a continuous layer of Ca with no voids for potential air gaps. Spread it right to and even over the edges. You want complete coverage. Be careful that you don't glue yourself to the blanks. I've seen a different method where you coat one surface with Ca and the other surface with water. I've heard it works well but I've always put glue on both surfaces. The amount of glue saved is negligible because you are spreading it so thin. To date, I've never had a failure at any joint so I hesitate to change something that works so well for the sake of a few pennies. Experiment and find out for yourself if you wish to try it.

After both surfaces are uniformly covered with a thin layer of Ca adhesive, it's time to put them together. Remember, it's important to have all of your clamps staged and ready to use. Put the two surfaces together and twist them to insure even contact. Get them into proper alignment quickly. Begin clamping the pieces together starting at one side and working towards the opposite side. Tighten the clamps as you apply them. I use the spring clamps available at the discount outlets. They provide sufficient clamp force, can be tightly packed, and are priced so I can have a lot of them. Time is of the essence. Get as many clamps on the glue up as you can fit. There is no such thing as having too many clamps. You should have a bit of adhesive squeeze out on all sides. Leave the squeeze out and deal with it later. Once I glue two pieces together, I leave them overnight. I DO NOT use accelerator. I let them cure naturally.

If you need thicker pieces yet, repeat the process. You can create any size and color combination you wish providing you can flatten the mating surfaces and you can clamp them together. As mentioned earlier, you can flatten the unfinished sides of the material and bond the next layers to them. Any special features you wish can be done much like you would assemble a segmented turning blank. Cut and glue whatever thicknesses or colors in your desired pattern.

There are two key points to pass along here. If your requirement is for thick pieces, glue only two thicknesses together at a time. I have not been very successful at putting three or more pieces together at one time. The time required to wet them together, align them, and get the assembly clamped is too long. My technique is to take all of the pieces to be used, glue them all up in pairs, and then repeat the process joining the pairs together as pairs, etc. until it's complete. The other key point is not to scrimp on cure time. The longer you can let assemblies cure, the better. I often glue things up that I won't need for weeks. I'm not sure what the minimum time threshold is but I've always used overnight as the minimum for any glue joint of Corian® to Corian®. Could it be done in a shorter period of time? It may but I've always planned far enough ahead to have plenty of curing time. I try to leave the clamps in place for the entire curing time if I can.

Once your blank is appropriately sized and colored, you are ready for the lathe. Like wood, knocking off corners is extra work and can be a pretty brutal process on the lathe. I recommend you remove the corneres prior to turning. Corian® can be worked with common shop tools. It will dull cutters quickly. Carbide cutters are preferable but non-carbide will work. The Corian® workpiece can be mounted on your lathe in the same manner as traditional wood pieces. I usually put it between centers to start. Because of the material hardness, you may want to make accommodations for the center points. After rounding and rough shaping, I often put a

spigot on it and hold it in a chuck. Use your experience at mounting work to guide you.

You can use your regular turning tools to turn Corian®. It can be cut or scraped using standard woodturning techniques. It requires sharp tools and it will dull them pretty quickly so stay close to your grinder. Many turners I know would rather scrape it because it's easier to sharpen their scrapers. I use my regular tools or various carbide tools I've made. The advantage to using the carbide turning tools is their edge holding capability while cutting difficult materials. Regardless of your cutting tools, Corian® cuts slower than most woods so take your time. Let the tools do the work. Cutting Corian® is more finesse than brute strength. You will get curls when you cut it with a gouge or skew but the thickness of the cut must be much lighter than with wood. It cuts like any other very hard plastic. Take your time and let the tools do the work. White knuckles are not in order or required here.

One of the nice characteristics of Corian® is that it's isotropic, that is having the same characteristics regardless of direction. In contrast to wood, it has no grain direction therefore its appearance, strength, and cutting characteristics are the same regardless of the orientation. Another advantage is inertness. The material is not affected by moisture and will not change dimension or characteristics regardless of the moisture conditions. It is affected by temperature but that really isn't an issue until you reach high temperatures. It's continuous coloring throughout the product means you won't cut through the color. What's on top is the same as you progress through the material.

After turning, it's time to sand and finish your piece. If you have glued Corian® to a piece of wood, sand and finish the wood as you do normally. As a filled plastic, Corian® requires no finish to be added. It's capable of being highly polished and being its own finish but the sanding is done a bit differently. Corian® is capable of a mirror like finish provided you take the time to do it properly.

Start your sanding with the appropriate grit based on your as turned finish. Sand at a slow speed (as you should be doing with all of your turnings) and progress through the grits. Don't skip any grits. The more grits you run though, the better the final result will be. Flaws not taken care of at each step of sanding will be very evident at the end. Because there is no grain direction, you can sand in any direction so take advantage of this fact to do some "cross sanding" at every grit if your turning design allows it. Using radial sanding only will not yield as nice of a result. Work your way through all of the grits through 2000 at a minimum always wiping your turning with a clean cloth at the completion of each grit. If you have any of the Novus Plastic Polishes, use those per the manufacturer instructions. The polishes contain a fine abrasive that will take you even finer than your original sanding. If you've taken care and followed the procedure, you should have a superb finish on the Corian® at this stage. There is nothing else required. Avoid scratching or marring it and it'll last forever.

If you want to take your finishing a step farther, you can use the MicroMesh products available from Micro-Surface. MicroMesh is a special abrasive used for plastics that goes way beyond the traditional sanding products. The Micro Mesh grits are numbered from 1800 to 12000. The 1800 Micro Mesh is equivalent to 600 grit sandpaper (in ANSI numbering), and 4000 Micro Mesh equal to 1500 grit. That takes the 12000 Micro Mesh way off our traditional scale for measuring sandpaper. If you intend to use the Micro Mesh series and you have the steps from 1800 to 12000, do your regular sanding to 400 or 600 and then start the Micro Mesh series at 1800 and progress through the entire range. Follow their instructions as to speeds and light touch. Because the abrasive is cushioned in a rubber like material, it's very easy to damage it with too much pressure or too high speed. Do not use the Novus Polishes after Micro Mesh sanding as you'll be going backwards. When you've finished the series, you'll be amazed at the final results.

There are a variety of applications for Corian®. In the past, I've used it to make pens, small bowls and lidded boxes, add accent trims, create inserts to thread, and as inlay material. The material threads superbly and makes a great insert into wood for the threading of lidded boxes, funeral urns, or multi-piece threaded

assemblies. Take advantage of the colors available. They range from the very subdued to the extremely bold. Use it as a sole material or combine it with wood. The variations are endless. Give Corian® a try. I think you'll like it.

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