

Sanding without the sand

As woodturners, we like to have an edged tool in our hands, with curls flying everywhere. Almost invariably, we end up with sandpaper. Our most common reaction to sanding is that it's a necessary evil. If the turned item is well formed coming off the tool, I actually enjoy moving up through the grits from 150 or 180 to 400 or 600; but when I start putting the finish on, I am often disappointed to find scratches. I hate scratches! This is when the sanding becomes really tedious and a chore. There are products that will help.

There are many reasons for scratches. The first, of course, is poor sanding technique. Let's leave that aside for another discussion and say you've sanded carefully, with the grain, and cleaned the surface at every grit. Even with proper technique, it's not unusual to find some scratches when you start getting a little gloss in your finish. The reason is the sandpaper. Conventional sandpaper is designed to be aggressive so that it will dig deeply and remove material. In its manufacture, the abrasive crystals are electrically charged so they will stand up, and they are locked into a hard resin base. Scratches arise because, at the microscopic level, sandpaper is a mass of rigidly-held sharp points of varying sizes and heights. When you apply the paper to a surface, it literally tears in to remove the material you are sanding. The crystals cut in a raking motion, leaving inconsistent scratch patterns. Some sandpapers have a better-controlled distribution of grain sizes than others, but ultimately the problem is all those sharp, irregular, hard points. Happily, there are alternatives.

First, let's get steel wool out of the way. In some ways, steel wool is a wonderful product. [Did you know that it was originally produced in the 19th century as an accidental waste product from metalworking lathes?] Those fine strands cut cleanly like hundreds of little gouges and leave an excellent surface. Although coarser grades can be used to remove scratches, this doesn't seem to be a common practice among woodturners. On the other hand, good old "four ought" (0000) does a great job of leveling a finish without leaving scratches. Even so, I will personally not use steel wool -- I cannot tolerate the residue. I'm just not going to have little bits of metal all over me and my surfaces, or embedded in the wood to later turn the area black. These can be a serious problem if they get into electrical equipment, and can be bad news on your eyeglasses. As noted in the December MCW Newsletter, steel wool is also a fire hazard. Regardless of whether you like steel wool or not, you'll want to read on, because there are excellent alternatives for removing scratches, leveling finishes without adding scratches, and achieving just the right amount of shine.



My goal with this article is not to tell you how to sand or to recommend specific products. Rather, I want to highlight the fact that we have easy access to a number of good options, such as sanding sponges, Abralon, Abranet, and Micro-Mesh, that you might not be aware of.

How we sand and what we sand with will depend, to a certain extent, on the size of the piece we're working on. My experience is with small and medium-sized pieces. For work on the lathe, I still mostly use traditional sanding discs -- in an electric drill, in a passive sander, in forceps, or by hand -- but I am beginning to experiment with Abranet discs (more on that below). Off the lathe, I use mostly sanding sponges and "cushioned abrasives" (Abralon or Micro-Mesh) to remove scratches from earlier sanding on the lathe (as they become visible during the finishing process), to level the finish between coats, and to achieve the final desired luster. (I still use sandpaper for sanding the nub off the foot, if the tail stock was used to the end.)

Non-woven abrasives

Did you ever wonder, like George Carlin, "What's a 'woven' abrasive?" Well, that would be things like "sandpaper" made with a cloth backing. Coated abrasives are created by bonding abrasive grains to one side of a paper or cloth material. They offer an aggressive method of stock removal as the grains come into contact with the surface being finished. Because of their basic structure, including a relatively hard substrate and variations in grain size, standard sanding products leave scratches. Coated abrasives clog fairly easily, and their cutting power constantly and quickly declines with use.

A non-woven abrasive is a finishing product in which the grit is not only embedded on the product's surface, but bonded throughout the web-like, three-dimensional, open structure of a nylon pad or sponge. Non-woven abrasives are designed to provide a controlled, sustained cutting action. Their spring-like construction greatly lessens the risk of gouging or scratching the surface of the work piece. As the nylon fibers of the product wear away, fresh abrasive grains are continuously exposed, providing a long life and consistent finish over time. They can be washed and reused.



Originally introduced in the 1970s by the 3M Corporation, non-woven products are typically made with aluminum oxide or silicon carbide abrasives. They are very flexible and mold nicely to the surface being sanded. They are reasonably tough, don't rust, and don't shed a rain of small particles like steel wool does. They are often known by their color (representing the grit size) and are also used for a wide variety of commercial and household applications away from woodworking. They come as pads, sheets, or rolls in different sizes, weights, grit sizes, and in many different brands. 3M's original Scotch-Brite® product line is perhaps the best known, but many others are now available. I have used Klingspor and Norton 3X with good success. Because of their rather benign cutting action, in my personal experience, I find that these products tend to behave as if they were a finer grit size than listed. For example, I may use a 220 sponge where I would never consider using 220 sandpaper.

Abralon

Combining the best features of sandpaper and non-woven products, Mirka's Abralon® is a very popular product for wood finishing. It is constructed with a flexible, abrasive-coated, mesh fabric face, a ¼"-thick foam center, and hook & loop backing. The closely-sized silicon carbide abrasive

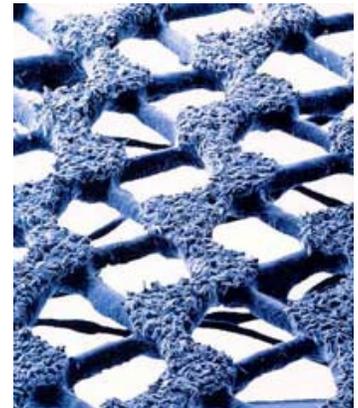
produces a very smooth sanding pattern, works well on wood, finishes, metal, and plastics, and is excellent on contoured surfaces and edges. The open weave of the fabric and foam core allow water and oils to flow freely, resulting in both non-clogging and cooling. Because the foam center provides even surface pressure, using this material eliminates cross-grain scratches and finger marks and results in an improved finish. It comes in discs and pads that can be used on or off the lathe, wet or dry, and by machine or by hand. It cleans up easily with a flick of the finger, with compressed air, or in soapy water or mineral spirits and is said to last at least five times longer than sandpaper. It has been reported that the discs can be damaged if used hard, such as in sanding the interrupted edges of a square turning.



Abralon is effective on both wood and finish, but I personally use it mainly on finish. Grits range from 180 to 4000 (on the frequently-used European FEPA “P” scale), but I find this material to be much less aggressive than sandpaper, and I typically start at 500 (after sanding to P600). If I have scratches from the sandpaper, I will drop back to the 360 (“medium-fine”), or even to a 220 non-woven pad first, if needed. The “fine” (500 grit) and “super-fine” pads (1000 grit) level the finish; the “micro-fine” (2000 grit) leaves a satin finish; and the “mirror-fine” (4000 grit) creates a nice gloss. This is my standard finishing product. I generally buff with carnauba wax at the end.

Abranet

Abranet®, also from the Mirka company, is a relatively new and possibly revolutionary product composed of a see-through fabric mesh with aluminum oxide particles bonded to it. This unique, net-like sanding material contains innumerable small holes, making it very resistant to clogging. This makes it good for wet sanding and for sanding green or oily woods. The result is said to be a very even and uniform sanding pattern and a smooth surface. I haven’t used it enough to be able to talk about scratch patterns, nor have I used it for leveling a finish yet. Finer grades are supposedly excellent for this purpose. It is said to be “dust free”, but I don’t understand that. It can also be used for sanding many materials other than wood.



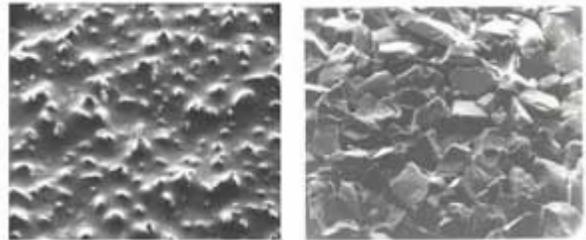
Abranet comes in sheets, rolls, and hook & loop discs and can be attached, for example, to a hand sanding block as well as to standard rotary sanding mandrels. It doesn’t work well if folded. I like the discs because they are very aggressive and don’t clog. To me, they seem to be a little more aggressive than their grit ratings. They are said to be durable, long-lasting, and hence cost effective, but I’ve had a problem with the disc edges getting torn or wrinkled. Consequently, I’m not happy with the high prices. Because the discs are quite insubstantial, heavy use can lead to damaging the underlying hook & loop surface on your sanding mandrel; as a result, disposable interface pads called “protectors” are available for purchase.

I have to reserve judgment on this material -- I don’t have enough experience with it to recommend it. I intend to continue to experiment with potential uses on both bare wood and

finishes. Right now, I tend to prefer other products, and I suspect that Abranet will remain, at least for me, a niche product to be used in situations when other materials tend to clog.

Micro-Mesh

Micro-Mesh® from Micro-Surface Finishing Products Inc. is a unique, cushioned abrasive capable of giving very fine, controlled scratch patterns. It is similar to Abralon in concept, but very different in construction. The backing is long-lasting cotton cloth to which a flexible cushioning layer is applied. On top of this layer is a flexible, resilient glue (not a hard resin) that will hold the abrasive crystals while allowing them to subtly move and rotate without coming loose. When you start to apply pressure to sand with Micro-Mesh, the crystals go into the cushioning layer while beginning to cut a bit. If you push harder, they will go further into the cushioning layer, thus serving as a safety valve. The cushioning layer allows the crystals to cut with a planing motion that leaves a refined and consistent scratch pattern that can result in high levels of gloss, instead of the deep, irregular scratches that sandpaper makes. The figure shows the difference at the microscopic level between sandpaper on the left and Micro-Mesh on the right.



Micro-Mesh was originally designed to polish acrylic windshields on aircraft and found application for most hard plastics, fiberglass, epoxy, gel-coat, raw and finished wood, cultured marble, and metals. It is not an aggressive stock remover. Common sandpaper products are required for the removal of deep scratches prior to using Micro-Mesh to polish the surface back to clarity or a high gloss. The nine available grits range from 1500 to 12000. Note that these go higher than Abralon, if that is desired. The 1500 is roughly equivalent to American CAMI-scale 600 sandpaper, and the 12000 will leave scratch patterns that cannot be detected by the human eye.

There are four different kinds (Aluminum oxide, Regular, MX, and MXD), so one must be careful in purchasing -- it has been said that these different products don't necessarily even share the same grit ratings. I can't speak to that. All formats of Micro-Mesh are available in sheets, rolls, discs, belts, pads, and specialty kits. For most woodworking uses, the "Regular" would be preferred. Woodworking applications include woodturning with all types of woods (particularly pen turning), polishing on the lathe, removing scratches and stains, rubbing out top coats, replacing rotten stone and steel wool, and removing defects in all types of finishes. Micro-mesh abrasives can polish to an optically clear, reflective state or, through the use of a coarser grit, leave a matte or satin finish.



Micro-Mesh can be used wet or dry, with either water, water/detergent, or oils as a lubricant. Solvents will cause delamination. In my experience, Micro-Mesh tends to clog rather quickly. Stopping to wash and dry it is a bit of a frustration. I use it mainly by hand. Some people feel that Micro-Mesh is too soft for power sanding except when using a lubricant, as in wet sanding. The bonding agent that binds the grit to the backing may be a little softer than used in Abralon. If

you generate too much heat, you can melt the surface of the disk to the wood. My experience with Micro-Mesh is limited because I generally stop at Abralon 4000.

If you wish, you may examine and purchase non-woven pads, Abralon, and Abranet at a discount from an MCW member. See Bob Stroman at meetings or view and order his products at www.2sand.com. (Be sure to ask for your club discount.) He does not carry Micro-Mesh products at this time.

Scotch-Brite®, Abralon®, Abranet®, and Micro-Mesh® are all registered trademark names.

*Always use common sense. Things that work in one situation may not work in another. Follow all Safety Rules. If it feels wrong, it probably is; stop and rethink. **Your Mileage May Vary***