

# Low-fuss, less-dust sanding

Though necessary, sanding is tedious and boring. Cut to the quick with these time-savers and you'll achieve smooth results in a hurry.



**S**anding is like doing taxes. The payoff doesn't make the paperwork more pleasant. In both cases, you face big penalties for hasty mistakes or cutting corners. Unfortunately for woodworkers, you sand more than once a year and you can't hire someone to do it for you.

So, what's to like about sanding? The repetitive movements? The dust? The suspicion that your first coat of stain will betray every little mistake? We can't make sanding

fun, but we can offer you ways to get top-notch results with no wasted effort.

For starters, picture what happens when sanding grit touches grain. Sandpaper abrasives work like a series of tiny plane blades, scraping off fine particles of wood with each pass. Coarse grits remove machining marks, medium grits obliterate the coarse scratches, and increasingly finer grits erase scratches made by the previous grit, ending with scratches too fine to detect.

## Give yourself less to sand

Maintaining or adjusting your tools takes time, but not as much time as sanding off deep scratches, ridges, or burn marks left by dull or nicked cutting tools. Replace worn or low-cost saw blades with long-wearing carbide ones. Sharpen or replace dull or nicked jointer knives, and upgrade your most frequently used router bits. Each of these precautions brings you closer to starting with a smoother surface.



Glue globs can scratch the surface of your work either when they break loose or become trapped on your sanding pad.

**Time-saving tips:** As you machine workpieces, cut any curves as precisely as possible. If you bandsaw a curve to within 1/32" of your pattern line, you'll waste less time using your sander as a shaping tool.

On glue-ups, scrape away globs of sanding off dried chunks. Bits of dried glue can attach themselves to your sandpaper or break loose from the joint, as shown above, turning into giant abrasive grits that will mar the surface of your work.

## Stock up on sandpaper

Now gather your sanding tools. For sanding flat surfaces, a random-orbit sander works best because its pad leaves behind small irregularly spaced swirls. Other types of sanders work better for curves or help preserve square edges. To help you sort out the best tools for your sanding needs, consult "Sander Types and Their Uses," below.

With your sanding tools at hand, it's time to stock up on a broad assortment of coated abrasive papers, from 80 grit on the coarse side all the way through 320 grit for fine dry sanding and scuff sanding between coats of finish. If you'll eventually rub out your finish topcoats, add some 600-grit wet/dry paper to your shopping list. Use the sanding grit chart on page 79 as a reference. It shows the different grits in both major measuring systems and how abrasive grain sizes shrink as the grit number increases.

**Time-saving tip:** Depending on the type and amount of work you'll be doing, save time and money by buying sandpaper in bulk packs or rolls instead of the 5-packs on many store shelves.

That way, you'll be more likely to have the abrasive you need when you need it, giving you fewer excuses for wearing down paper to the backing for want of a replacement. Change sandpaper as soon as it ceases to remove stock efficiently.

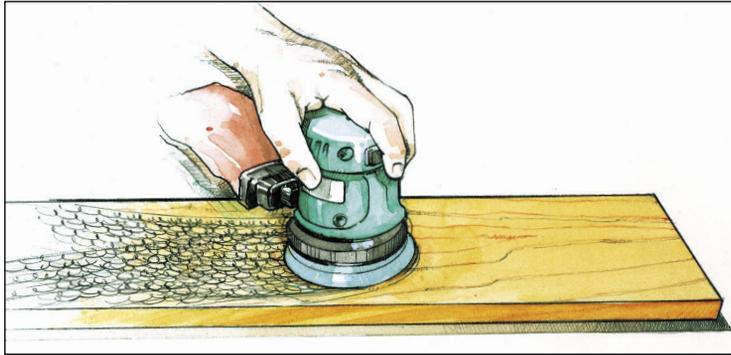
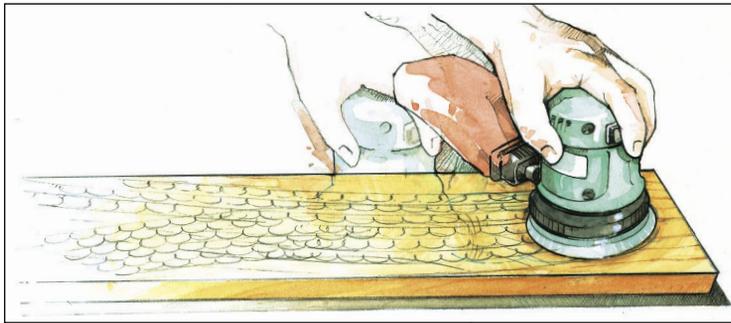
In addition, bulk sandpaper packs save money two ways. For example, we bought a 5-pack of 9x11" aluminum oxide paper for what came to 35 cents a sheet at a local store, compared to 28 cents per sheet for a 50-pack purchased by mail. The \$3.50 you save for 50 sheets isn't a fortune, but you've also avoided as many as 10 trips to the store. Don't need that much sandpaper? Buy in bulk and split the cost and sandpaper with your woodworking buddies.



## Sander types and their uses

type	belt	detail	finish	random-orbit	rotary tool	disc	drum	oscillating spindle
uses	Rapid stock removal; shaping wood	Reaches into corners and tight spots; some models have attachments for sanding contours	Fine sanding; reaches into corners of flat surfaces	Flat surfaces and large panels; random action helps lessen swirl marks on stained surfaces	Tight curves and hard-to-reach areas; valuable where light weight and portability are important	Flat surfaces and outside curves; preserves 90° angles or miters; fast and precise stock removal; can be used to bevel	Fine-tunes stock thickness; produces uniform scratch marks; excellent for thickening figured stock prone to tearout	Sands edges at 90° angle; handles inside curves; less prone to burning hardwoods; multiple spindle diameters
limitations	Hard to control for precise sanding; gouging is a risk if not carefully controlled	Not suited for large areas	Less aggressive than random-orbit sanders; more apparent swirl marks than with a random-orbit sander	Doesn't sand curved surfaces, inside corners, and profiled or narrow edges	Few grit options; loads with debris quickly; can gouge wood; less precise than a spindle sander; not for flat surfaces	Can't reach inside curves; burns hardwoods easily; limited to workpieces half the diameter of the sanding disc	Limited to flat surfaces up to twice the width of the drum (on open-ended models); high prices	Only suitable for sanding edges, not flat surfaces

## SLOW DOWN FOR EVEN FINISHES



Moving a random orbit sander too quickly across the face of your work, as shown at top, prevents individual swirl marks from overlapping and concealing each other, as they do in the lower example.

## HOW TO AVOID GOOFS



Uneven sanding—especially around the edges of flat surfaces—will lead to blotchiness on stained areas.



For consistent smoothness, sand the edges of a flat panel separately from the center portion. Make an equal number of passes on all three sections.



Random-orbit sanders work with or across the grain. Make a habit of sanding with the grain to lessen the impact of mistakes. On a door such as this, sand the rails first. Any cross-grain oversanding disappears as you sand the stiles.

## Set a pace, not a race

Repetitive sanding movements can quickly reinforce careless techniques, turning them into habits. Develop the right sanding routines, though, and you'll train yourself how to create the right surface for a flawless finish.

For instance, hand-sanding conditions you to rapidly move the sanding pad back and forth across the surface, so you repeat those motions using your power sander and end up with strings of swirl marks. Random-orbit sanders make hundreds of tiny swirls per minute, but even those speeds aren't fast enough to leave a smooth surface if the swirls aren't connected. Move the sander slowly enough that the swirls overlap and partially erase each other, as illustrated *above*.

To create interlocking swirls, develop a consistent sanding pace suited to your sander's operating speed. For example, a random-orbit sander that makes  $\frac{3}{32}$ " orbits leaves roughly 11 swirls per inch. For those swirls to interconnect at all, you need at least 22 swirls per inch or 264 per foot. On a random-orbit sander producing 200 orbits per second, that means moving the sander slower than one foot per second just for the bare minimum of interconnected swirls. The slower you move, the more interconnected your swirls become and the more they cancel out each other. Practice with your sander until you discover the quickest pace that's swirl-free.

A uniform sanding pace also produces more consistent finishing results on each

workpiece and among pieces in a project, so practice pacing how rapidly you move your sander until that pace becomes a habit.

The edges of a flat surface present special sanding problems that show up after your stain soaks in. In the usual back-and-forth sanding motion, the far edges get one pass for every two trips the sander makes across the center. If the wood is going to receive a natural finish, that's not a problem. But if the wood is going to be stained, more pigment will lodge in the less sanded ends and edges than the smoother middle, throwing off the color of the finished piece.

For a solution, divide the surface into three parts—two ends and the middle, as illustrated *above right*. Sand the ends thoroughly before doing the middle, which will connect all three areas.

End-grain presents another set of problems when you're preparing wood to be

*(Continued on page 80)*

# Sanding facts at a glance

## Time-saving tips

**Don't oversand.** For most woods with typical machining marks, start at 120 or 150 grit and work your way up to 220 grit.

**Sand less when not staining.** Stain pigments emphasize swirl marks and unevenness, but clear finishes do not accentuate sanding scratches.

**Forgiving finishes.** Satin finishes are more forgiving of a less-than-perfect sanding job than gloss finishes.

**Fine-sand turnings.** Take your turnings up to 600 grit to conceal cross-grain scratches.

**Sand, then assemble.** Some parts can be hard to sand on a completed project. Identify them from the start, and sand them prior to assembly.

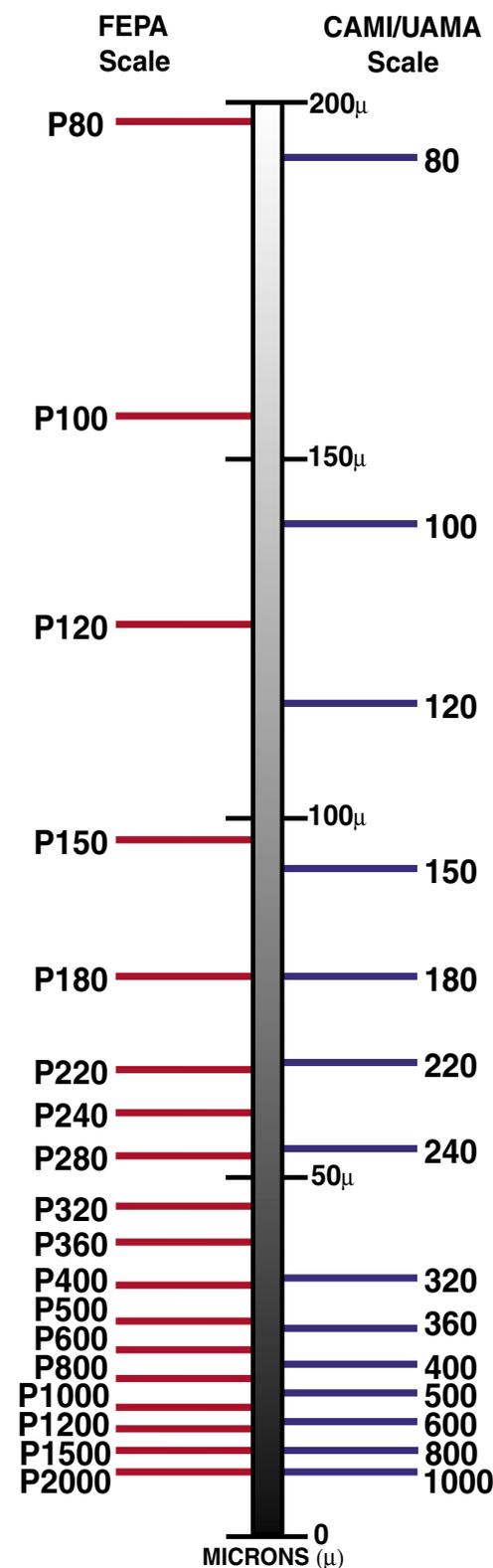
**Breathe easy.** It's hard to focus on your work while choking on clouds of sawdust. Invest in a respirator, dust collection system, and air filtration.

**Pad your work.** Why mar one face of your work while you sand the other? A router pad both cushions and holds your workpiece as you sand.

**Going in circles.** For curved or round surfaces, such as spindles, use a sanding sponge that molds itself to the workpiece.

## Common Sanding Grits

Abrasives graded on the Federation of European Producers of Abrasives (FEPA) system have a "P" before the number. CAMI/UAMA refers to the Coated Abrasives Manufacturers' Institute/Unified Abrasives Manufacturers' Association.



## Sandpaper Terms

■ **Backing.** Usually paper or cloth to which abrasive grains are bonded. Paper is used mostly for sheets and discs that can take advantage of its low cost. Cloth is used for belts, rolls, some discs, and wet-dry sheets where durability is essential. Both come in various thicknesses.

■ **Bond.** Coats of adhesive that hold grit onto a backing. This can be in the form of a glue or, for greater durability, a resin.

■ **Closed coat.** Backing completely covered with abrasive grains. This helps increase the abrasive's power on bare wood but also increases the likelihood of clogging, or loading, in such applications as removing paint. For comparison, see "open coat" below.

■ **Coated abrasive.** Technical term for sandpaper. It refers to an abrasive product combining a backing, bond, and abrasive material.

■ **Cut rate.** The speed with which an abrasive removes material.

■ **Friable.** The ability of abrasive grains to fracture into smaller but resharpened particles with use.

■ **Grain.** Material crushed to form abrasive granules. This can be natural material, such as garnet, or synthetics, such as aluminum oxide.

■ **Grit.** This number indicates abrasive grain size, as measured in the quantity of openings per linear inch in a screen through which the grain will pass. The two main grading systems are explained and compared at *left*.

■ **Loading.** Sawdust and grit buildup between or covering the abrasive grains, making the sandpaper less effective. Buildup can be removed with a rubber cleaning stick or reduced with the use of open coat or steared sandpaper.

■ **Open coat.** Backing that's 40–70 percent covered with abrasive grains. Reducing the coverage helps lessen clogging from pitch or paint.

■ **Scuffing.** Mildly abrading a surface to remove raised fibers or help a finish bond to itself between coats.

■ **Stearate.** A dry lubricant, often zinc, that prevents coated abrasives from clogging during use.



Wearing down a sanding disc to the cloth or paper backing costs you hours to save pennies. If you can't see or feel the grit working, change discs and toss out the old one.

stained. Sand end-grain two grits above what you sand the face. If you stop at 180 grit on the face, for example, sand the ends to at least 320 grit to keep wood fibers from wicking up too much stain.

You also get uneven results by stretching a sanding disc or sheet beyond its useful life, like the bare 80-grit disc shown at left. How long a piece of coated abrasive paper lasts depends partly on the type of abrasive grit you're using. Different grit materials degrade in different ways. Garnet paper, for example, breaks down faster than most other types of grit, although its granules fracture into smaller cutting edges instead of losing their effectiveness by becoming blunted. That makes it the least durable material, but also the least expensive. The most durable types of sandpaper use silicon carbide or ceramic alumina grit. Alumina zirconia grit holds up longer than garnet, making it a durable choice for sanding belts. For more information about different types of sandpaper and their uses, see the chart below.

When using a fresh sheet, resist the urge to press down on your sander. Instead, let the fresh cutting edges of the granules do their work. When it feels like the newness

has worn off of the paper, check for buildup and press down lightly as you sand. Once you sense that you have to press down firmly to get any results at all, change sheets or discs and throw the old ones away.

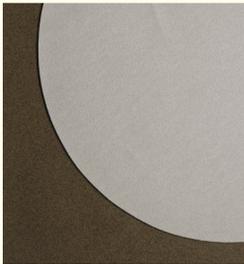
### Sand by the Numbers

Tempted to skip grits and save time on a large project? Don't. When you skip from 150 grit to 220 grit, bypassing the 180-grit stage, you're expecting a fine sandpaper to remove coarse scratches. It'll do the job eventually, but you'll spend far more time to do the job. The typical range of grits to keep on hand are as follows: 80, 100, 120, 150, 180, 220 or 240, 320, and 400 grit.

For rough surfaces with noticeable tool marks, start as low as 80 grit, especially in places where you're sanding by hand. Well-tuned machinery that leaves smoother surfaces—coupled with the aggressive cutting speed of a random-orbit sander—lets you jump ahead to 120 or even 150 grit. Stop at 180 grit for unstained surfaces, or proceed up to 220 grit for surfaces to be stained.

**Time-saving tip:** If these stopping points seem low, you may be oversanding. Polishing bare wood up to 400 or 600 grit

## Use the right abrasive for the job

					
	<b>Aluminum Oxide</b>	<b>Alumina Zirconia</b>	<b>Garnet</b>	<b>Ceramic Alumina</b>	<b>Silicon Carbide</b>
<b>Description</b>	Made from abrasive-grade bauxite, it has a high density and resists fracturing more than garnet	A mix of aluminum and zirconium, this grit removes wood quickly; granules self-sharpen	Made of brittle silicate crystals and grains, garnet fractures to produce fresh, though smaller, cutting surfaces; wears quickly	Aluminum oxide that's coated and then fired in a kiln; aggressive grit cuts faster than regular aluminum oxide	Hard, sharp grains cut faster than any other grain; frequently used to finish metals; available in extremely fine grits (1000-grit and finer)
<b>Uses</b>	General purpose sanding of wood or metal; most commonly used grit material	General purpose sanding of wood or metal where durability is important	Finish sanding of wood, especially in higher grits	General purpose sanding of wood or metal where maximum durability is needed	Suitable for wood, surface finishes, metals and plastics; can be used wet or dry
<b>Costs*</b>	\$.35/sheet (paper), \$.95/sheet (cloth)	\$2.13/3×21" belt	\$.25/sheet (paper)	\$.99/sheet	\$.63/sheet (paper)

\* Prices are estimates. Actual prices vary with vendor, brand, and quantity purchased.



Contour pads allow you to divide complex profiles into sandable surfaces. These are from Lee Valley Tool (800/871-8158 or [leevalley.com](http://leevalley.com); item #68Z82.10).



Potential stain problems can't hide from this trick. Swipe sanded surfaces with mineral spirits to highlight blemishes or under-sanded spots that stain might reveal.

doesn't necessarily yield a smoother surface for anything other than an oil finish. That's because you see and touch film-forming finishes, not the wood itself. So take the time you used to spend sanding bare wood and devote it to rubbing out your varnish or polyurethane topcoat. That's a difference you'll notice.

Edges, round parts, and detail work require you to slow down. Switch to hand-sanding with an assortment of contour pads in the shapes that will reach into and around complex curves and angles, as shown *above*.

Whether you're power-sanding or working by hand, thoroughly cleaning off the old grit at the end of each stage will spare you time wasted on sanding do-overs. Coarser grits can contaminate your sanding surface and leave new deep scratches even as your finer grits remove the previous layer of scratches.

Removing sanding grit and dust with compressed air also blows dust out of the wood

pores, but it makes a mess of your shop. To control dust levels, vacuum the surface with a soft brush attachment that dislodges debris from the surface. Even a fine-bristle brush alone does the job if you're sanding outdoors. Tack rags still work well, but their oily contents need to be used with care if you'll be applying a water-based stain or finish.

A clean wood surface also can be damaged by bits of loose, coarse grit if you're careless with how you handle your sander. Lay sanders on their side and sandpaper face up on a workbench to avoid picking up grit from earlier sanding work. If you vacuum your work between grits, vacuum your workbench as well and shake out sanding mats.

### Finish Your Finish

Once your bare wood reaches ready-to-finish smoothness, sanding abrasives still have a role to play.

If you intend to use a water-based finish, prepare the wood by raising and flattening the grain. Moisten a rag with water and wipe the surface to stand the loose wood fibers on end where they can be knocked off with sandpaper that's one grit beyond the last grit you used.

**Time-saving tip:** Just a couple of light passes will knock off nibs raised by moistening wood. Sanding too much exposes a new fresh layer of wood with a new batch of nibs that need to be wetted and removed. For oil-based finishes, go directly from your final sanding to finishing.

**Time-saving tip:** As with sanding the raised grain on bare wood, a light touch with 240- or 320-grit paper is all you need after using a seal coat and to sand between coats of finish. Sanding too hard or too long cuts through the seal coat and into the bare wood or stain. Measure your sanding time in seconds, not minutes. One or two light passes by hand usually does the trick.

Once your seal coat has dried, it may still be rough enough that you can apply a second coat without sanding first. That's another precaution against oversanding.

You sand between coats not to create a smooth surface so much as to create a rough one. Lacquers and shellac don't require between-coat sanding because each coat partially dissolves and bonds with the previous coat. Finishes like polyurethane and varnish don't bond with the smooth surfaces each coat creates. So between coats, scuff-sand the surface just enough for the new coat to form a mechanical bond with the previous coat. Again, easy does it with the sander. 🌲

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Illustration: **Mike Mittermeier**

## SHOP TIP

### File under "S" for simple sanding storage system

There are lots of ways to organize stray pieces of sandpaper, but few save money and space like these multi-pocket accordion folders.

We labeled the pockets to store 80- through 1,000-grit sheets and discs. The blue folder holds wet-dry paper while red one stores dry coated abrasives. The pair cost less than \$20 from an office supply store.

