

Get Smooth Surfaces,



Over the years, I've worked with everything from buttery mahogany to the most challenging figured maple, and in that time I've developed a straightforward system for getting a beautifully tearout-free surface—no matter how twisted the grain or wild the figure.

Getting silky-smooth results quickly, regardless of the species of wood, isn't magic. Part of the game is to keep tearout from showing up in the first place. But when it does rear its head, you need to know what to do.

Smart machine work minimizes tearout as you mill flat, square, and straight surfaces on rough lumber. Handplaning smooths those jointed, planed, and sawn surfaces quickly, while keeping them flat. A scraper is the perfect weapon for attacking any isolated spots of remaining tearout. And finally, sanding polishes everything, leaving a stunning surface that's ready for finish. That's the process, and you can rely on it with almost any wood, provided you approach it systematically.

Milling matters

Good surface prep starts long before you break out a handplane. If you introduce a

Rough to smooth, in three key steps

1

Mill smart

Smart machine work keeps tearout to a minimum, which means you'll spend less time on handwork.



2

Remove machine marks

A sharp, well-tuned smoothing plane makes quick work of defects like mill marks and tearout, while preserving that flatness you worked so hard to create at the milling stage.



Even on the Wildest Woods

ton of tearout in the milling process, you'll be chasing it the rest of the way.

The most important tip is to keep your machines well-tuned and, above all, sharp. Also, as you're selecting and roughing out your stock, build in extra cushion for every part, in every dimension. This will come in handy later, when you need an extra pass on the jointer, planer, or tablesaw to get rid of unexpected tearout.

After the workpiece is cut to rough length, look at the edges to determine the way the grain is running through the board. Draw an exaggerated line on both edges indicating the overall grain direction.

Test your read of the grain by running one face over the jointer. If there's excessive tearout, flip the board and run it the other way. If tearout persists, make sure you're not feeding the board too fast. Faster feed rates result in fewer cuts per inch; when you push a piece of stock quickly over the knives, you're asking them to remove more material per swipe, which creates wide mill marks and increases the chances of tearout.

After flattening one face on the jointer, mill the opposite face using the thickness planer. If your planer offers variable feed rates, set it to the slowest speed.

How one pro heads off tearout at every pass

BY MATT WAJDA

Because I tend to get better results with the planer than with the jointer, I try to leave myself enough extra thickness so I can run both sides of my stock on the planer, leaving less tearout to deal with by hand.

After milling the faces, the usual next steps are to joint one edge, then trim the opposite edge to final width at the tablesaw. But if you are getting tearout no matter which way you run an edge on the jointer, just plan on trimming both edges on the tablesaw. Sawn edges don't tear out because the blade is cutting parallel to the long fibers, not perpendicular to them like the jointer and planer. This is where that extra width comes in handy.

Be sure to replace your grain direction marks on the edges.

Cut joinery now—In most cases, before working surfaces with hand tools, you should lay out and cut all the joinery first. Handwork can be inconsistent, changing overall thicknesses, and even tapering boards a bit. One exception to this rule is dovetails. If you handplane the inside faces after the dovetails are cut, you will create gaps between the pins and tails.

Handplanes are faster than sandpaper

Some woodworkers are content to move from the machine to a random-orbit sander to remove tearout and milling marks. I start with my smoothing plane for two important reasons. It's much faster than using a sander, and it maintains those flat surfaces you worked so hard to get on the machines. Flat surfaces simply look better under a finish.

Any smoothing plane will do (no. 4, 4½, bevel-up, whatever), but it needs to be sharp. One pass with a dull or poorly tuned plane can cause much more tearout than it removes.

Plane the faces first, following your grain-direction marks on the edge. Don't look for a full shaving on the first pass. Instead, advance the blade little by little until it barely engages the work, just



3

Troubleshoot and polish

Light sanding is all you'll need to get rid of any handplane tracks. If there is any tearout left, judicious scraper work is the fastest way to eliminate it.



1

Milling: Get flat and square with



Work in the right direction and make sure your blades are sharp. Also, build in some extra cushion in each dimension during rough layout. That way you'll have room to re-mill a face or rip off a torn-out edge if you misread the grain.

JOINT ONE FACE FLAT

Mark the grain direction. Before you start milling stock, read the grain's direction and mark the edge with an exaggerated slash, so you can refer to it at a glance.



clipping the tops of the ridges left by the machines and hitting some other high points. The goal is a continuous, very thin shaving that's wispy and almost translucent.

Overlap consecutive passes by about 1/2 in. Once you have removed all the mill marks and are getting continuous shavings everywhere, stop, even if some isolated tearout remains. The light tracks left by the handplane are OK. They'll be removed in the next steps.

Scrape away any lingering tearout

If I've successfully removed all the tearout and milling marks with my smoothing plane, I go straight to light sanding. But if isolated spots of tearout remain, I pick up my card scraper. A scraper has a higher cutting angle, which means it's virtually impossible for it to create more tearout. But it must be wielded carefully, since it can quickly create hollows in the surface that will be apparent under a finish.

For a scraper to work correctly, it needs a fine burr on its edges, and to get that burr those edges need to start out flat, square, and polished. My other tip is to roll the burr at not more than 5°. This keeps the scraper nearly perpendicular to the work, and lets you push it with forward pressure, rather than downward pressure. This helps control the depth of cut. If the scraper is producing dust, not fluffy shavings, re-sharpen it. (For more great tips, see Handwork:

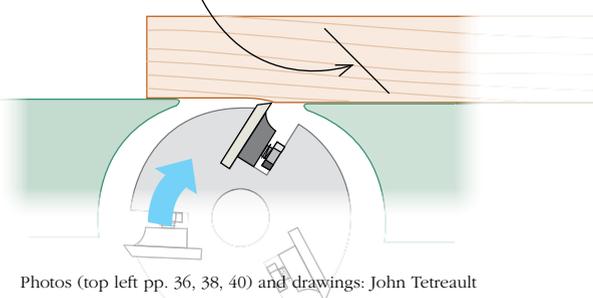


The right depth of cut. Just a hair more than 1/32 in. (inset) is about right. A heavier cut encourages tearout, and a lighter one can cause the jointer's blades to burnish the surface instead of cutting, which dulls the blades. Grain can be deceiving, so if you get excessive tearout, flip the board and run it the other way. Don't forget to change your reference mark on the edge of the board.

JOINTING WITH THE GRAIN

The jointer cuts from below, so where possible you want the grain to run from high to low as you cut. A pass in the other direction here would create major tearout.

Grain runs downhill. ← Feed direction



less tearout

PLANE TO THICKNESS



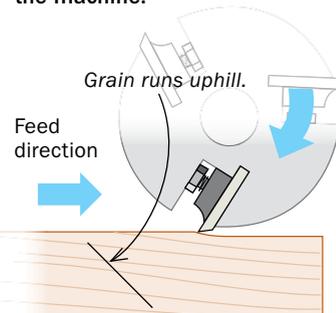
Take it slow. If your planer has speed controls, turn the speed down as low as it will go. Slowing the feed rate increases the cuts per inch, reducing the appearance of machine marks and discouraging tearout.



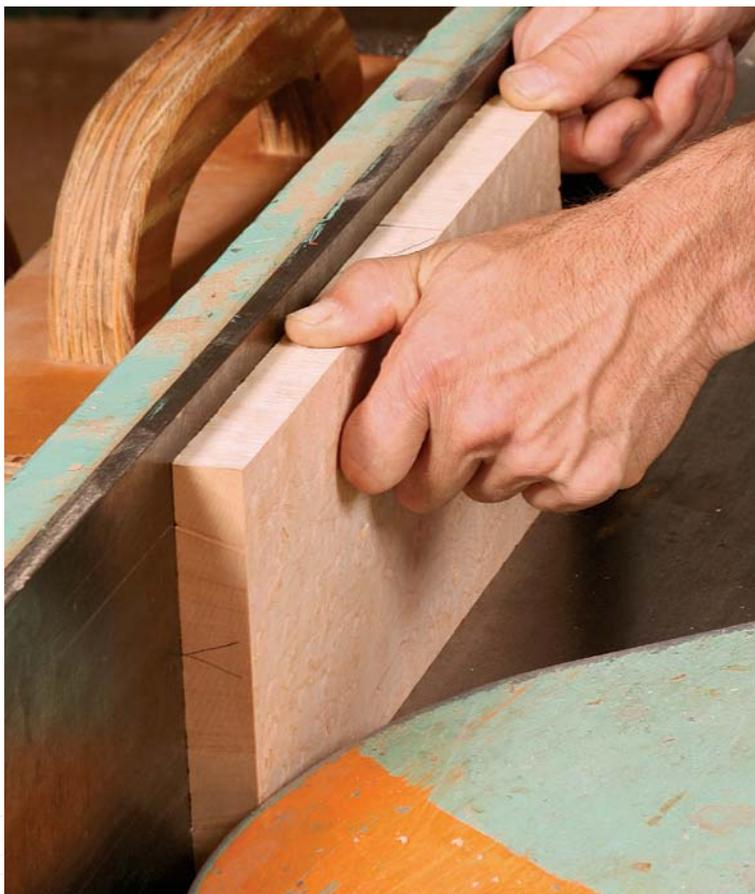
Plane both sides. Wajda finds that his planer produces less tearout than his jointer, so he factors in enough extra thickness to plane both sides of the board.

PLANING WITH THE GRAIN

A planer's knives are oriented above the board, not below it like on the jointer. So for the cleanest results, the grain should run from low to high as it passes through the machine.



JOINT AND RIP TO WIDTH



Establish an edge. With the faces complete, establish your first square edge at the jointer. If you've left some extra width, you don't have to worry about tearout, because you can remove it at the tablesaw (right).

TIP

TABLESAW TAMES TORN-OUT EDGES



Still got tearout?

If the edge grain tears out no matter which direction you run the board, don't worry.



Trim the opposite edge.

Even with tearout, the jointed edge is flat and can be used as the reference at the tablesaw. Trim the opposite edge while removing as little material as possible.



Trim the jointed edge too.

Now flip the board and rip it to final width. The tablesaw will not create tearout, even on the wildest woods.

2

Plane away machine marks

Coming off the machines, your stock is flat and square, but it's not smooth. It has scallops on the faces from the planer's knives, saw marks on the edges from the tablesaw blade, and, with tricky woods, it probably has significant tearout. A sharp, well-tuned handplane is the best tool for removing all these surface defects.

"The Right Way to Sharpen Your Scraper," *FWW* #227.) If you can't get the hang of burnishing a scraper, no worries—you can always move right to sanding at this point.

Go after the worst spots first, working with the grain. Start directly over the tearout, then blend the surrounding area as you go. A card scraper will make the workpiece less flat, and it's easy to become fixated on one spot. So remember that the surface must be feathered out from where the most material has been removed, to avoid leaving an obvious hollow. When treating a spot that's $\frac{1}{32}$ in. deep, for example, I'll feather it out over at least 6 to 8 in. I don't recommend using a

SOUP UP YOUR SMOOTHER



Fine-tune the chipbreaker. The chipbreaker stops the blade from chattering during the cut. To do its job well, it must mate seamlessly with the blade, about $\frac{1}{32}$ in. back from the edge.



Advance the frog. To minimize tearout, the plane's mouth must be closed down to about $\frac{1}{64}$ in. You can do this by advancing the frog or installing a thicker aftermarket blade.



Tighten the mouth. The tighter the mouth opening, the better the shaving is held down right ahead of the cut, preventing tearout.



The sound of success. Take a very light cut, advancing the blade until it just engages the work. On your first pass, you should hear a distinct "zip" sound, indicating that the blade is just clipping the tops off the ridges left by the planer.

TIP

TRY GOING CROSS-GRAIN



If the grain is tearing out no matter what you do, re-hone the blade and try planing across the grain. This leaves a rougher surface than going with the grain, but it won't create tearout.

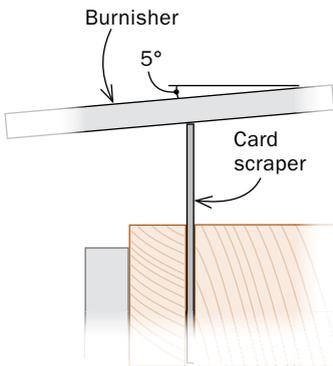
3 Fine-tune for a flawless surface



With handplaning complete, the milling marks and most of the tearout should be gone. Isolated tearout likely remains, along with fine track marks left by the smoothing plane. If there's tearout, turn to a scraper first. If not, go straight to sanding, which leaves a uniform surface that's ready for finish.

SCRAPE AWAY TEAROUT

Turn a fine burr. A burr that's 5° or less lets you scrape in a more vertical position, which is easier to control.

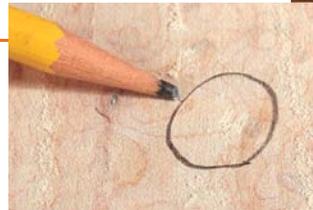


Fluffy shavings, not dust. Concentrate pressure forward instead of downward. The card will flex less and create a wider, shallower footprint, making it harder to create noticeable hollows. Start on the worst tearout and feather out from there. Then make passes over the whole surface.

THEN SAND



Sand by hand. For small surfaces like this drawer front, Wajda sands by hand, starting with P150 (120 if the surface is rough from planing cross-grain), working up to 220. For larger surfaces, he uses a random-orbit sander.



Missed some tearout? Sanding dust will fill tearout you overlooked earlier (inset), making it stand out. Depending on how deep it is, Wajda might go back to the scraper (right) or even the handplane (be sure to brush away the dust and loose abrasive first), and then work back through the process.



scraper on narrow edges. It will be too hard to control.

Sanding creates a uniform surface

For relatively small surfaces, I always sand by hand, starting with P150 grit and moving up to at least P220. On large flat surfaces, I do save time by using a random-orbit sander, but there are keys to success. Let the sander's weight provide all the downward

pressure, and always attach a shop vacuum to remove dust efficiently. The abrasive will work better and won't leave the telltale sander swirls created when excess dust accumulates under the disk.

For hand-sanding, don't use your hand alone. Instead, wrap the paper around a piece of 3/4-in. plywood with cork glued to one face. Sand in the direction of the grain and work in systematic, overlapping

strokes. When the grit isn't changing the surface anymore, move up to the next grit.

Take the time to learn these skills, use a systematic approach, and you'll get flawless surfaces on the wildest woods—and take your furniture to a new level. □

Matt Wajda owns River City Furnituremaking in Rollinsford, N.H., and teaches at North Bennet Street School in Boston.