

A man with glasses, wearing a blue long-sleeved shirt and a tan work vest, is focused on his work in a workshop. He is using a hand plane to smooth a piece of wood on a workbench. The workshop is filled with various tools and materials, including a brick wall in the background and a wooden shelf with tools. The lighting is warm and natural, highlighting the textures of the wood and the man's concentration.

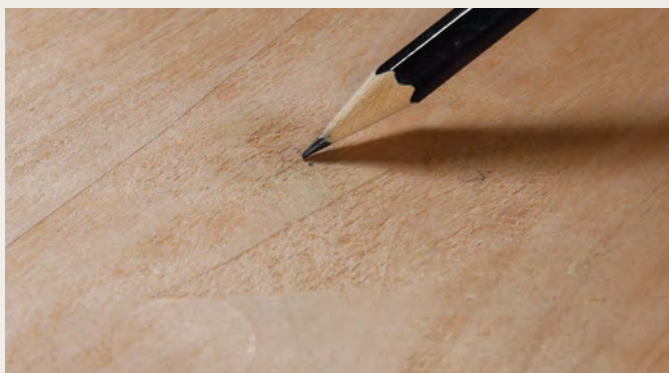
Techniques for Taming Tearout

Don't let gnarly grain stand in your way **BY GARY ROGOWSKI**

Why tearout happens

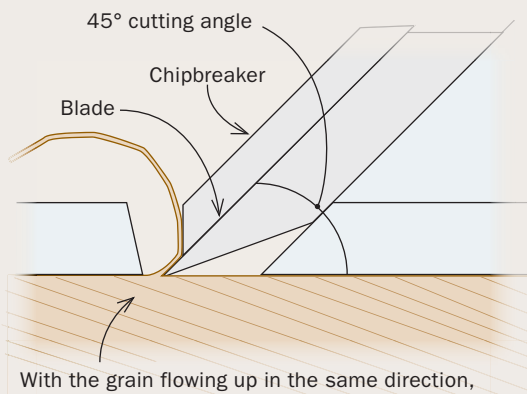


Straight grain is no problem. Under the best circumstances, a board has easy-to-read grain that flows in one direction. Plane in the right direction and you should be tearout-free.



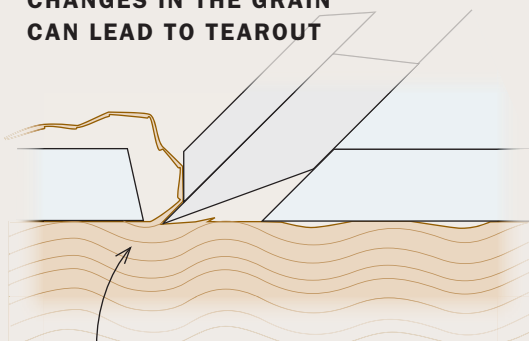
Trouble spot. This tight area of dipping grain in a figured cherry board is hard to work around, and may be too much for a standard bench plane to handle cleanly.

PLANING WITH THE RISING GRAIN LEAVES A SMOOTH SURFACE



With the grain flowing up in the same direction, the plane cuts cleanly.

CHANGES IN THE GRAIN CAN LEAD TO TEAROUT



On figured wood, the grain changes frequently, which can catch the blade and cause tearout. But you can minimize it with the right plane setup.

It feels like the universe is punishing me when a board tears out while I'm handplaning, as if something I did as a kid is coming back to haunt me. After all, I select boards in part for their looks and grain, so when those work against me, fixing tearout seems like penance.

Sometimes avoiding tearout is easy: Choose well-behaved wood. Take alder: When I want ease, I go with that. But I don't want to build

everything out of alder. In fact, for years black cherry was my wood of choice despite its frustrating difficulties. Its grain can rise and fall so much it resembles ocean waves, and its diffuse porous surface can make reading the grain a struggle. Still, it's so beautiful I couldn't help myself.

So obviously I won't let a little pain stop me from using beautiful boards. To make sure my projects don't suffer, I keep a few handplaning strategies in my back pocket. Some involve the blade, some involve the chipbreaker, but they all let you forestall sanding, a dusty mess I avoid as long as I can. Many of the techniques result in a tool that's harder to push, but they're all easier than dealing with torn-out grain after the fact.



Better results with standard bench planes

LIGHTEN THE CUT

A heavy cut digs deeper into the wood, making shavings more likely to follow falling grain and lever out ahead of the blade.



A thicker shaving means more chance for tearout.



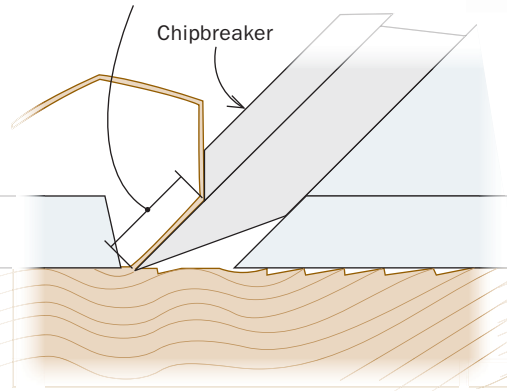
Taking a thinner shaving can limit tearout.

MOVE THE CHIPBREAKER

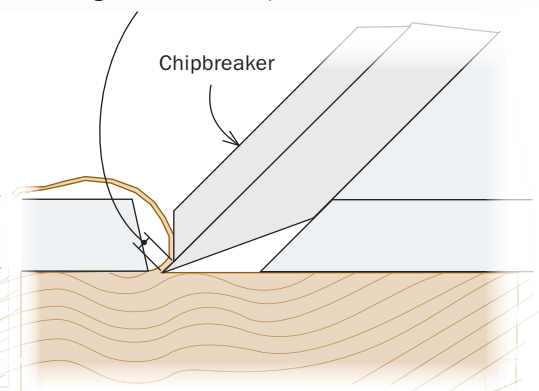
A chipbreaker closer to the cutting edge will break shavings earlier, limiting their tendency to follow falling grain.



If the chipbreaker is too far back, a shaving can follow plunging grain ahead of the cut and lead to tearout.



Moving the chipbreaker closer to the edge (about $\frac{1}{64}$ in.) can crumble the shaving before it causes problems.



Start simple

Before I start modifying the blade or chipbreaker, I begin with the basics. First, I back off the blade to take a thinner shaving. Tearout occurs when the grain lifts out ahead of the cut. When a plane's iron protrudes too far from the sole, it digs deeper into the wood, which can cause more tearout. Backing off the blade leads to a milder cut, reducing the likelihood of the grain getting away from you.

If a thinner shaving doesn't do the trick, I go to the second strategy, moving the chipbreaker closer to the cutting edge. This will roll back shavings sooner as they travel up the mouth, hopefully breaking them before they get the chance to tear out.

To handle more troublesome boards without modifying the chipbreaker or blade, I plane across the grain. This usually eliminates any tearout but leaves a very coarse surface that will need

scraping and sanding. However, there are still some other options that work well while leaving a finer surface.

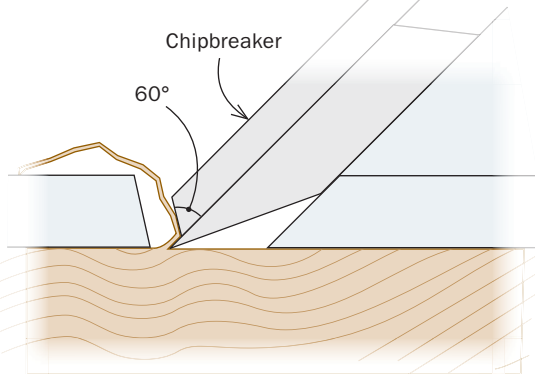
Make a high-angle chipbreaker

If you steepen the angle at the end of a chipbreaker, especially newer, thicker ones, it will work wonders. In fact, this is my favorite method. With the higher angle, the wood fibers are compressed and severed more abruptly as they ride up the blade and hit the chipbreaker, meaning tearout doesn't even have a chance to start. The tool is harder to push in this configuration, but it works wonders.

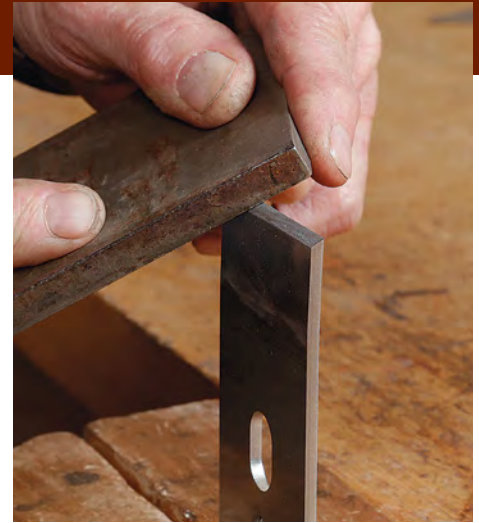
Some years ago I learned of two wood technologists, Yasunori Kawai and Chutaro Kato, who studied plane irons and how they cut wood. The two looked into three variables: grain direction, depth of cut, and how far back to set a chipbreaker. Their

STEEPEN THE CHIPBREAKER

With a steep angle on the chipbreaker, wood fibers are abruptly compressed and severed, greatly reducing tearout.



Establish the higher angle at the grinder. This is fast work, so use a light touch and look for an even scratch pattern across the whole edge.



Clean up with diamond stones. Remove the deep scratches and burr left from the grinder with a series of diamond stones. Rogowski stops at the fine grit.

Online Extra

To watch the Kato and Kawai video, head to FineWoodworking.com/282.

experiments kept the blade's bevel angle and cutting angle the same.

One of their results was that a blade without a chipbreaker, set to take a super light cut, 0.05mm, or just under 0.002 in., left little tearout even against the grain. More interestingly, though, were their results with the chipbreaker. By increasing the angle of the chipbreaker where it meets the blade, their tests showed that tearout could be greatly reduced or eliminated altogether even when cutting against the grain. I decided I had to run my own experiments.

What a high-angle chipbreaker does for my No. 4 is transformative. Mine's steepened to 60°. This setup changes the plane from a nice tool to one I can pull out for the gnarliest wood, boards that would otherwise cause me to weep with frustration.

Increase the cutting angle

Raising the geometry works just as well for the blade. Which method you choose depends on whether you're using a bevel-down or bevel-up plane. But the reason it works is always the same. By cutting at a higher angle, you roll the shaving over so fast that it doesn't have a chance to chase ahead of the cut and tear out.

Bevel-down planes—For bevel-down planes, you can increase the cutting angle two ways. First, you can raise its bedding angle. With common metal-body planes, you can simply switch out the frog. As typical frogs have 45° beds, I recommend going with 50°, also known as York pitch; or for really squirrely wood, 55°, which for some reason is also called middle pitch. Some modern-day plane makers sell these high-angle frogs either individually or as part of a plane. You can even find some that go above middle pitch. Wooden-body planes don't have frogs, so there's nothing to switch out. For a higher bedding angle in a wooden plane, you'll need to find a plane that's made that way or build one.

The second way is to back-bevel the blade, which lets you keep a standard frog on the plane.

The primary bevel on a bevel-down plane doesn't determine the cutting geometry. Beveling the back of the blade, on the other



Back up the frog. With a steeper angle on the chipbreaker, chips are more likely to jam in the plane's mouth, so you'll need to make more room for them. If you can't move the frog back, you may need to file the front of the mouth a little wider.

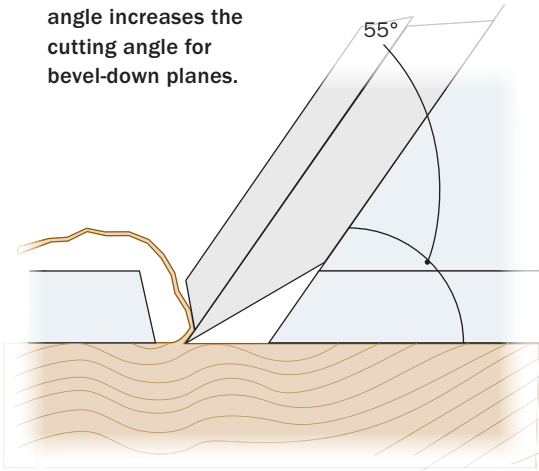


Skewing helps too. This creates more of a slicing cut, letting Rogowski plane troublesome boards.

Standard planes continued

USE A STEEPER FROG

A steeper bedding angle increases the cutting angle for bevel-down planes.



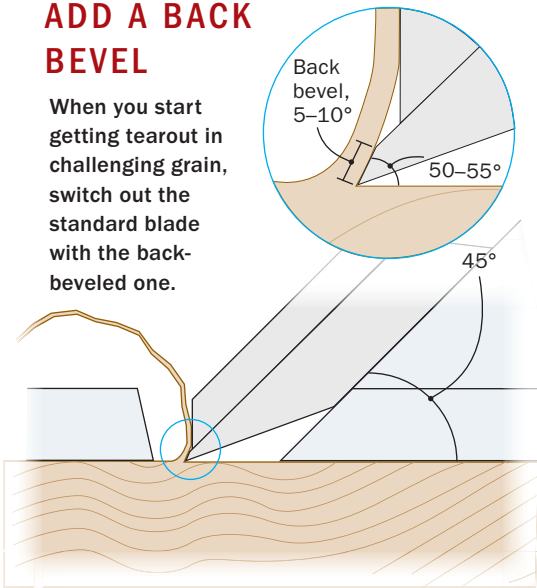
Switch out the frog. Using a higher-angle frog is a simple fix if you're willing to invest in the hardware.



Plow past wavy grain. This board's edge grain had a pronounced rise and fall. With a high-angle frog, Rogowski was able to leave a mirror surface with no defects.

ADD A BACK BEVEL

When you start getting tearout in challenging grain, switch out the standard blade with the back-beveled one.



Three short swipes on your finest stone. You want to keep this back-bevel short so it's easy to hone away.



Finish on a leather strop. Hold the blade at the same angle and pull it toward you quickly three times. Polish the main bevel too. Rogowski charges the strop with honing compound first.



Short and mighty. When you flip over your blade, you should see a thin polish that's distinct from the rest of the back across the whole edge (left). This tiny back-bevel lets you tackle troublesome grain with ease (below).

hand, increases the effective cutting angle. I typically back-bevel my irons 5° to 10°, which is easy enough to do freehand. Keep this bevel short so it's easy to hone away. And reinstall the chip-breaker so it's behind the back-bevel. If you don't, there will be an opening that will catch and jam with shavings.

Bevel-up planes—Increasing the cutting angle of a bevel-up plane is a lot more straightforward. You just hone the edge steeper.

If the blade in your bevel-up plane is bedded at 12° and honed at 25°—a standard setup—the cutting angle is 37°. This shallow angle is great for end grain, but it allows the face and edge grain to lift too far ahead of the cut, a recipe for tearout. Alternatively, if you hone a blade at 45°, the cutting angle becomes 57°, which is much better suited for ornery grain.

To accomplish this, you don't need to regrind the whole bevel, you can simply hone a steep secondary bevel. I recommend using a honing guide for this. Another option is to get a spare blade,

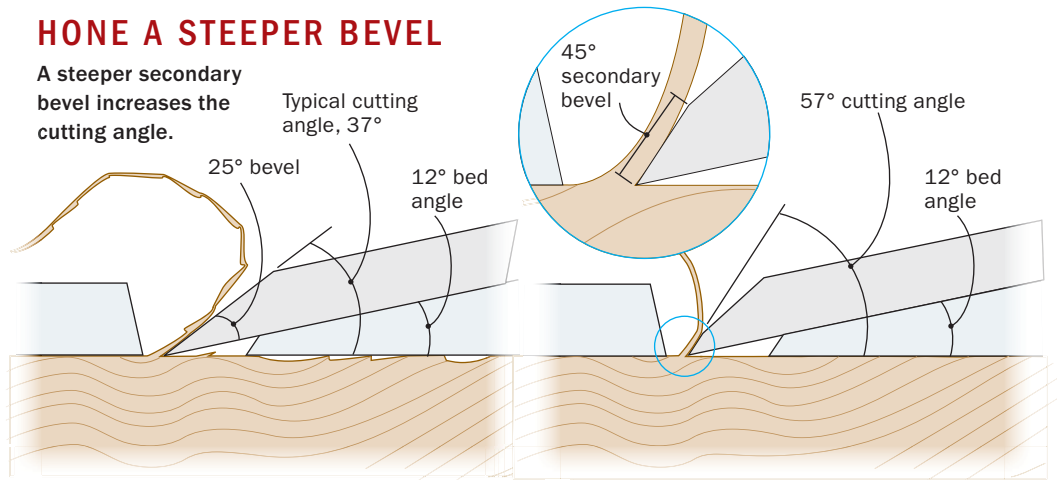


Bevel-up planes



HONE A STEEPER BEVEL

A steeper secondary bevel increases the cutting angle.



Hone at a higher angle. A digital angle finder is a simple way to find your desired angle for the secondary bevel, and a honing guide is an excellent way to keep it there. The honing process is quick. You can limit it to your finest stone. Keep even pressure along the whole edge.



grind its bevel at a higher angle, and keep it around for when your primary blade just isn't cutting it.

When all else fails, scrape

The scraper cures a thousand cases of tearout. While it seems almost too simple to work, the magic is again geometry. The scraper is a mere piece of steel that cuts most aggressively with a small burr. This burr cuts the wood at a high angle. As you push or pull your card scraper along, you tip it forward to cut at 100° or more—significantly higher than a bench plane's common bedding angle of 45°. The wood doesn't have a chance to tear out ahead of the cut because the shaving is rolled over so fast.

There are three types of scrapers. The first and simplest are card scrapers. You push these with your thumbs behind the blade. Second are cabinet scrapers, which have a thick scraper blade held in a body, like the old Stanley No. 80. This handled tool

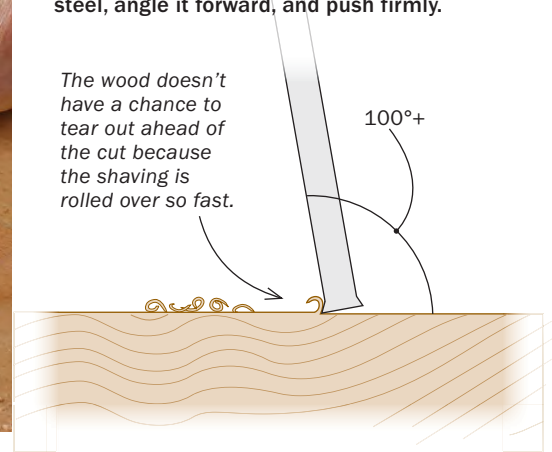


Can't argue with results. A steeper secondary bevel can turn a tool that works great for end grain into a one that's great for any grain.

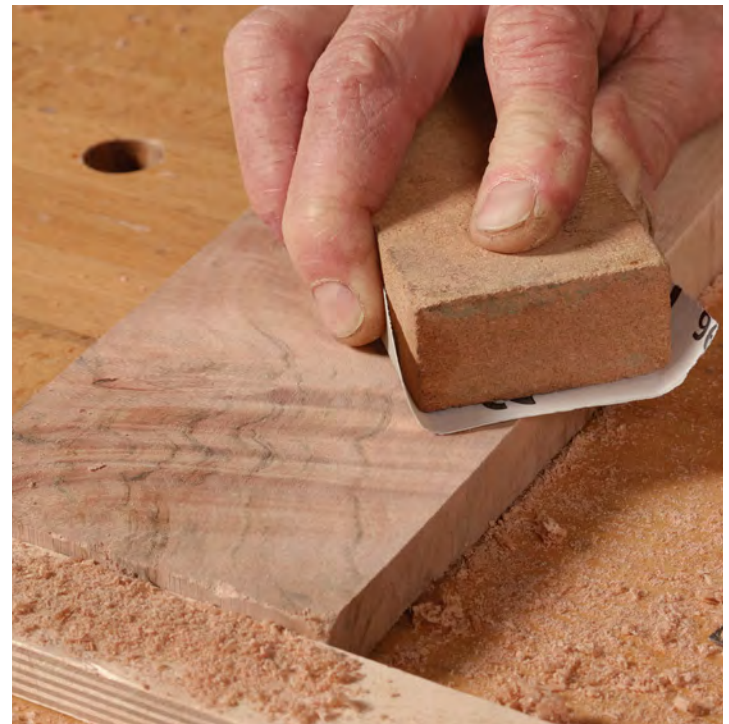
Scrapers

Sharpened correctly, a card scraper will take shavings in even the trickiest grain. Flex the steel, angle it forward, and push firmly.

The wood doesn't have a chance to tear out ahead of the cut because the shaving is rolled over so fast.



Cabinet scraper. This tool is essentially a scraper held in a spokeshave-like body. Its sole helps it keep surfaces flat, and its handles let you exert more force than with a card scraper.



Sanding's necessary afterward. Scrapers leave a surface not quite smooth enough for a fine finish, so follow up with fine-grit sandpaper wrapped around a sanding block.

looks like a spokeshave, but it needs a surface that's relatively flat to begin with. Finally there are scraper planes, which look like a handplane with the blade standing up in the body and tipped away from the user.

If scrapers are so adept at taming tearout, then why even bother with handplanes? There are several issues that handplanes solve. One, they remove wood quickly. The scraper takes a fine shaving in any direction, but it's a thin cut. It takes a long while to flatten a glue-up with a scraper.

Second, a handplane's sole helps to keep a surface flat. Card scrapers can dig a good-size divot in a board if you don't blend

in your passes with the surrounding area. And on ring porous woods, like white oak, scrapers tend to cut more aggressively in the softer early wood, leaving more of a ridged surface than a flat one. Handplanes glide over a board, taking off only the high spots.

Last, a sharpened and finely tuned blade in a plane leaves a polished smooth surface that is astonishing. Conversely, the scraper leaves a fuzzy surface that begs for fine sandpaper. So pick your weapon wisely. □

Gary Rogowski hosts the podcast *Splinters* at northwestwoodworking.com.