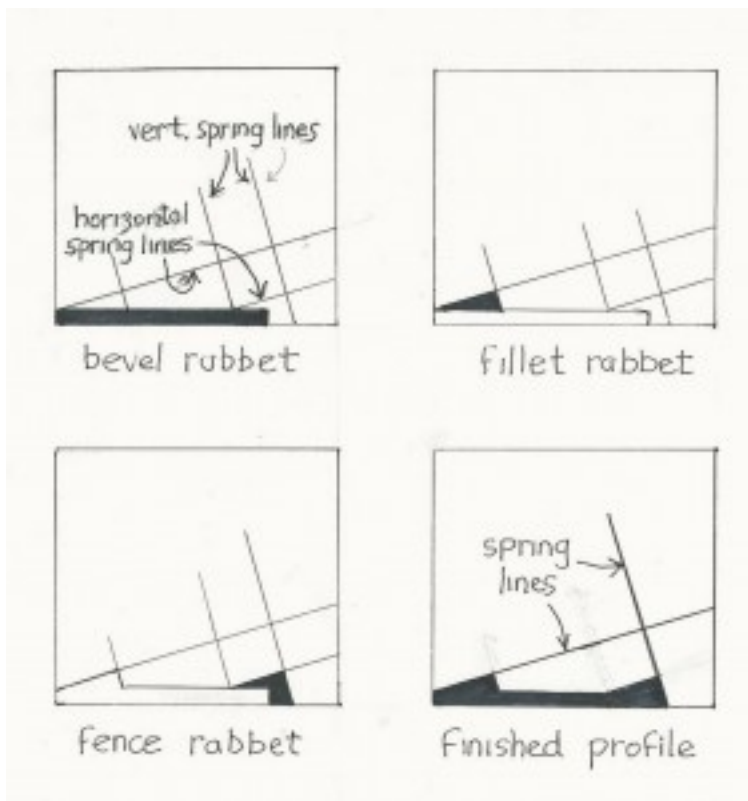




In my "Make a Panel-raising Plane" article in the [November 2013 issue of *Popular Woodworking Magazine*](#), the iron I use came from my reserve of "New, Old Stock" (NOS) irons. These irons were made in England up to about WWII. Each iron is tapered, and of laminated construction – the tool-steel cutting edge is forge-welded to the face of the iron body. The irons are not cut, meaning there is no slot for attachment of a cap iron. They are very traditional in that respect. The iron is already tempered, and if your iron is also tempered, it's important to retain that temper as the cutting edge is shaped. (While you may not have NOS blades in your shop, you can purchase a blade similar to the one I use on this plane from [Hock Tools](#).)

Before any cutting-edge shaping begins, the iron is ground along the long edges to an angle matching the cheek angles of the plane, which are about 23°. That means the left edge is acute and the right edge is obtuse. I also make sure the iron is parallel over its length, or possibly slightly tapered away from the cutting edge.



The iron has three beveled edges when finally shaped. A short bevel on the right edge defines the fillet, the long bevel in the middle defines the angled face of the panel and the somewhat shorter bevel on the left defines the tongue that fits into the door or lid frame. The fillet bevel is a side bevel and is quite steep, generating more of a scraping action than a cutting action. Sharpening this edge to a typical acute angle of 25° or so would give a bevel that is wide and thin and weak in terms of the type of cutting it does. The other two bevels are arrayed more on the leading edge of the iron and are sharpened to a standard bevel (25° - 30°) since they cut in the typical manner (slicing and levering).

I don't actually measure the bevel angles of the iron as I hone them, but judge them by eye. The width of a bevel for cutting and slicing should be a bit more than twice (but less than three times) the thickness of the iron at the cutting edge. This translates to a bevel angle between 25° and 30°. The width of the fillet bevel could be the same as the thickness of the iron at that point or even a bit less. I use an angle somewhere between 45° and 70°.

The first step in shaping the iron is to paint the face (the tool steel surface) with layout fluid. I use Dykem Steel Red Layout Fluid (www.mcmaster-carr.com). (This is basically a red dye in an alcohol base.) Let the dye dry, then insert the iron in the plane body and set it with the wedge.



Set the iron forward so it protrudes to its full width. Use a long thin awl to scribe the plane profile onto the iron, and keep the awl as flat as possible on the bed. Make one scribe mark for each face of the profile. Remove the iron from the plane, and clean up the scribe marks.

A lot of material needs to be removed from the cutting end of these irons. I use a 1"-wide Norton 36 grit SG wheel (blue). The tool rest is set square to the wheel so I am grinding a very blunt edge to the iron. This reduces the chance of losing the temper of the iron as I work through this massive step. Cool the iron every couple of passes across the stone, and dress the stone on occasion to remove glazing, etc and improve the cutting action.

Grind the two long edges close to the line, but do not grind the fillet edge just yet. With the long edges ground, the length of the iron is reduced. When the fillet edge is ground, it is the width of the iron that's reduced. If you cut the fillet edge to size too soon – and make the iron undersized – you'll have to grind away a lot of iron to recover. The long edges require more care so they should be done first, while the fillet edge is very short and should be done last.

The scribe lines are just a rough guide. As I get close to the lines, I begin to grind the iron to the precise

shape using my eye as the guide.



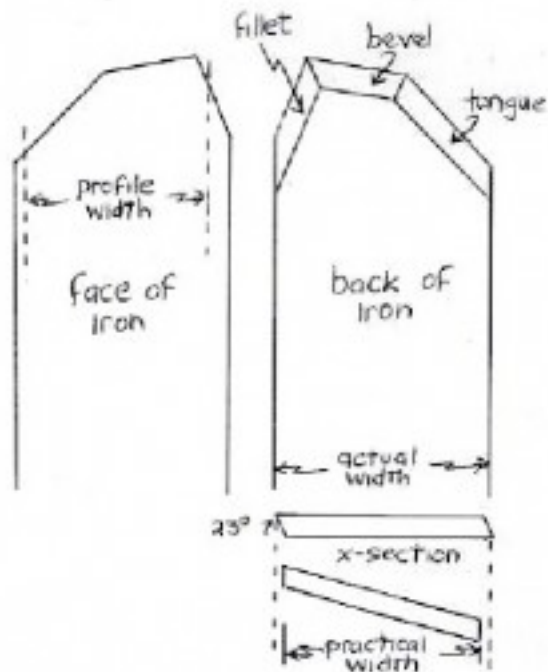
To check my progress, I hold the iron firmly to the bed with my thumb with the plane upside down and the toe facing to me. I then advance the iron to just peak over the sole (keeping the iron centered in the bed). The face of the iron is red from the layout fluid, but the newly ground, blunt edge is shiny. Take care to only judge the iron profile from the red face. The fillet edge can be ground to close to its final dimension, but leave it fat (at least $1/16$ " shy of the final edge).

When shaping the bevels, it is important to keep the bevels consistent. The approach to the cutting edge should be even and consistent in thickness throughout the process, and the bevel should be ground with only one facet across its face. The arris between two adjacent bevels should be sharp, and at the cutting edge, perfectly bisect the angle between the two bevels.

When grinding the final cutting bevel angle, I set the tool rest at a low angle relative to the grinding stone (about as low as I can get) . I use a Veritas tool rest, which is articulated and slotted for the stone, so I can get good support all the way along my iron as I grind. As I grind the bevel, I judge that the tool rest angle I have set gives me a bevel length that is about 2-1/2 times the iron thickness. That is a good cutting angle; it's in the range of 25° - 30° . I may need to tweak the tool-rest angle as the bevel develops in order to optimize the cutting angle.

The iron is resting flat on the tool rest, my forefinger acts as a fence against the proximal edge of the rest and my thumb is pressing on the iron face to advance or retreat the iron as I grind. The iron is canted left or right to keep the developing bevel square to the stone. The cutting action happens in the center, between the right and left thirds of the wheel, back and forth. Never allow the iron to slide off the edge of the wheel.

I typically grind the middle bevel first, then the left bevel and save the fillet bevel for last. As the edge is ground thinner and thinner, be very disciplined about cooling the iron. Take the edge down to a skinny 32 " or so in order to preserve the temper. As you grind, check that the final width of the bevel is sufficiently wide to give a good cutting angle. The edge should be very consistent in thickness at this point. Do not grind into the edge itself.



The second bevel should have the same width as the first bevel. Tweak this bevel until the arris is sharp and hits the intersection of the two bevels. Grind the fillet edge to a steep bevel, but hold this well short of the final dimension.

At this point, the bevels are all hollow ground and relatively wide. With a good sense of touch and great care, it's possible to have the iron rest flat on the bevel on the honing stone. Rather than push the iron straight down the stone, I hold the iron sideways so I'm honing along the length rather than the width of the bevel. This gives me a straighter bevel and less inadvertent introduction of camber. It is very important to distribute the pressure evenly along the bevel or you'll taper the bevel along its length. Stop every stroke or two on the stone and inspect the progress. Because the cutting edge is just a skinny $1/32''$ thick, it does not take long to get to the burr stage.

I have two approaches to honing. For one-off irons, I generally use a medium diamond plate followed by Japanese stones (#800, #1,200 and #4,000 grit). I hone the face of the iron first, and then turn my attention to the bevels. When working the bevels, I take the burr off with the #4,000-grit stone.

I also use a WorkSharp where I put the same grit on both faces of the glass plate and work my way through a number of grits (in stages from #36 to #2,000 grit, depending on the amount of work to be done). The throughput with this device is amazing (I often sharpen 30-40 chisels and 30 block, jack and smoothing planes over a four-hour period). Because I work on the upper surface of the machine, a finely attuned sense of touch is necessary to keep the bevels even. Cooling is necessary at all stages.



Throughout this honing process, I focus on the two long bevels, testing the progress by reinserting the iron in the plane body. I check that the two bevels are parallel to the plane body profile, and that the intersection of the bevels matches the arris on the plane profile. If the intersection is misplaced, both bevels must be reworked. Changing only one bevel will move the arris between the two bevels to one side or the other. This arris needs to be in line with the intersection of the two bevels.

Once I am completely happy with the two long bevels, I turn my attention to tweaking the fillet bevel. Maintaining this part of the iron fat until this point keeps me from being found slumped over my bench crying a bucket full of tears. Creep up to the final dimension, first with the rough grind, then with the honing steps. Because this bevel is small, it is easy to get multiple facets as you work down the bevel. Final honing is always done by hand so I don't overshoot the dimensions. The bevel ideally should have a rhombohedron shape and extend to below the plane body profile.

[– Willard “Bill” Anderson, contributor](#)