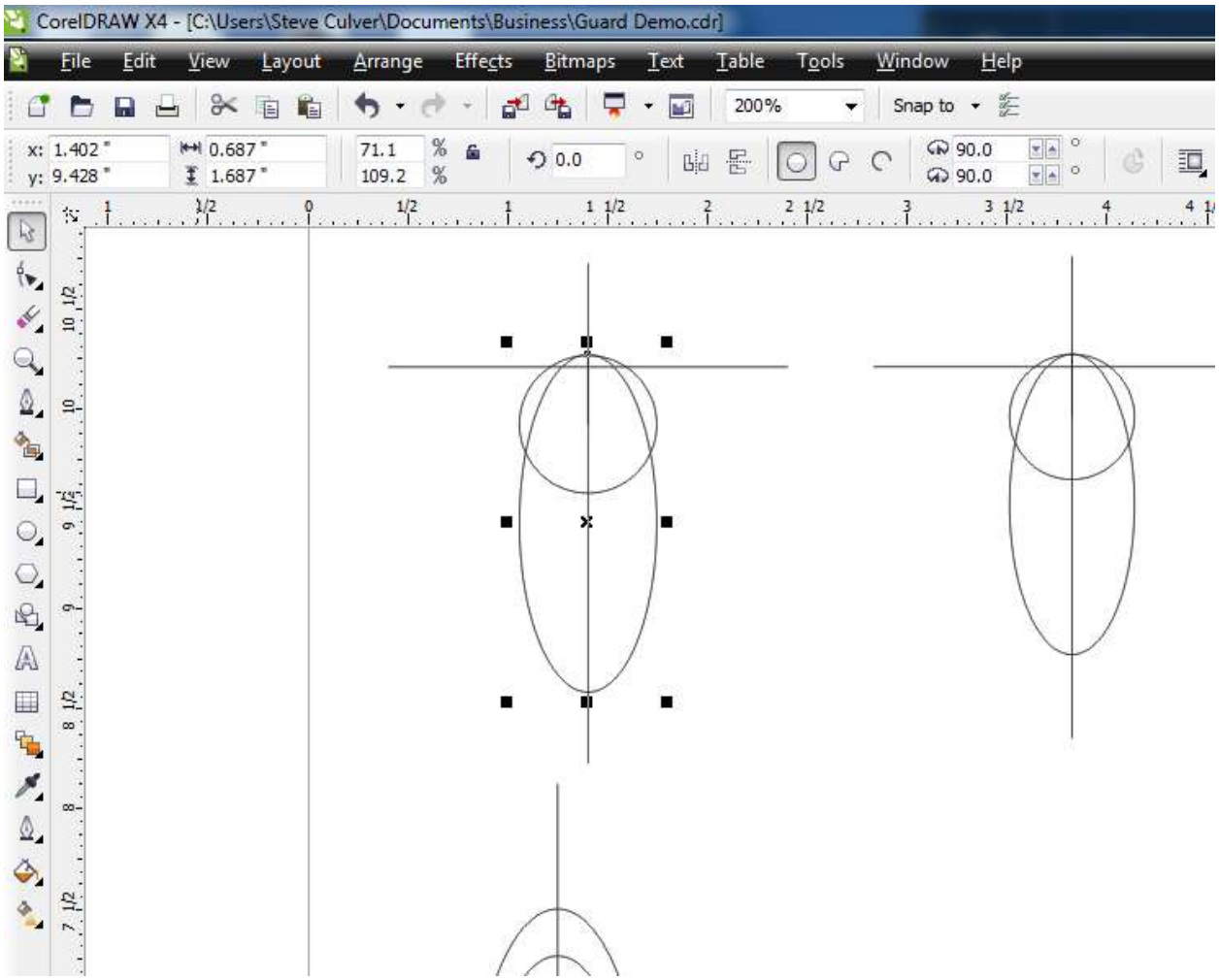
Precision guard and fitting designing, using paper patterns.

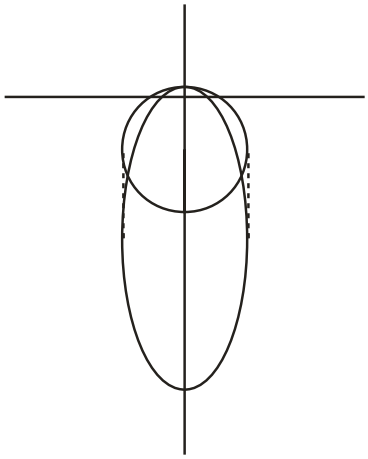
By Steve Culver

I do all of my guards and knife fittings designs using Corel Draw. Any decent CAD or drawing program should be capable of doing the same thing. The important thing about the program that I use is the ability to tell the software what size I want the fitting to be and then to be able to locate the drawing of the fitting to a coordinate on the page to facilitate aligning other elements to it.

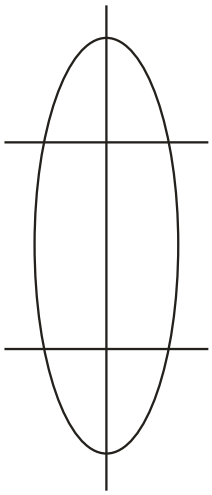
In the image below, you can see near the top of the picture where the size and coordinate boxes are for these operations. These boxes display the X and Y coordinates, plus the width and height of the selected oval. By knowing where the guard design is located on the page, I am able to place a center line exactly through the middle of it. This center line will be used to align the paper pattern on the guard material and ensure that it is centered over the slot for the blade tang. The horizontal line near the top of the oval in the image below is where the spine of the blade will be located on this finished guard.



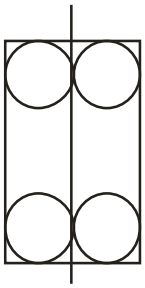
My hunter guards are designed using an oval to designate the bottom of the guard and a circle of the same diameter that the oval is wide for the top of the guard. When sawing and grinding the guard out, the material is removed in a straight line along the edge of the circle and oval.



In designing an oval guard for a Bowie, the same process is used. The height and width of the guard is designated, then a center line and two horizontal lines for the spine and bottom of the riccasso are placed on the pattern.



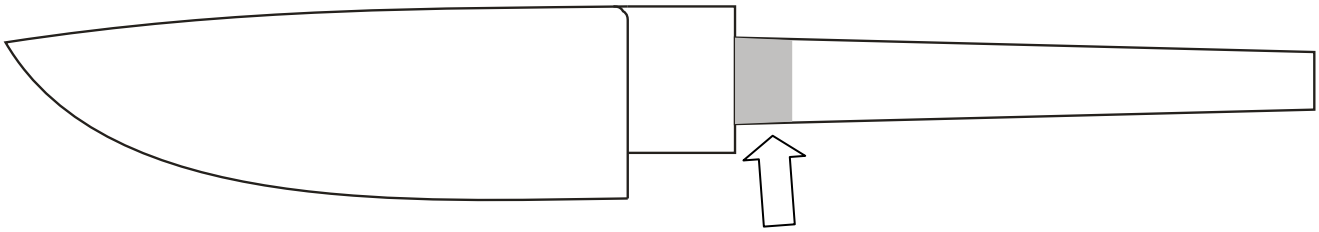
Ferrules for a Bowie are similarly done. However, no horizontal lines are needed, as a ferrule is typically the same height as the riccasso.



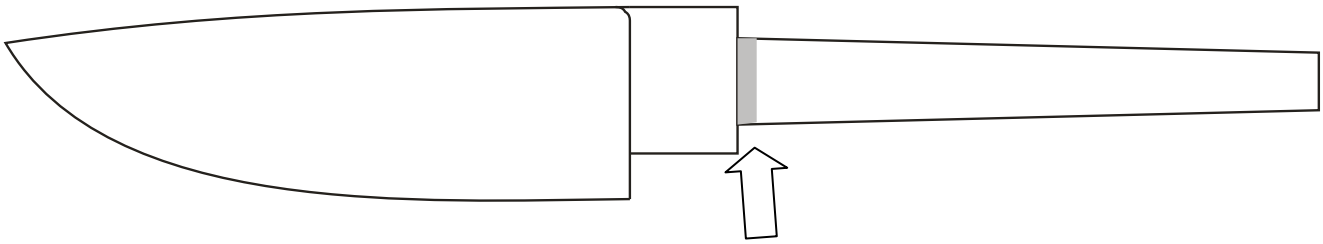
My process for fitting a guard to the blade tang is to cut the slot in the guard material first. I like to cut the tang slot to the exact diameter of the end mill. If you have to index the milling table to cut the slot, the slop in the table ways can result in a slot that is out of dimension. By milling the slot the width of the diameter of the end mill, I can ensure that the slot will be an exact width. I then file the tang to fit the slot by removing equal amounts of material from each side of the tang.

I have an assortment of end mills of different diameters to mill guard slots for whatever blade that I am working with. On blades that I forge from 1/4" stock, I typically wind up with a riccasso area that is .215" to .220" thick. I mill guard slots for these blades using a 3/16" (.187) end mill. This leaves me with around .030" of material to remove from the tang, which creates guard shoulders of about .015" on each side of the tang.

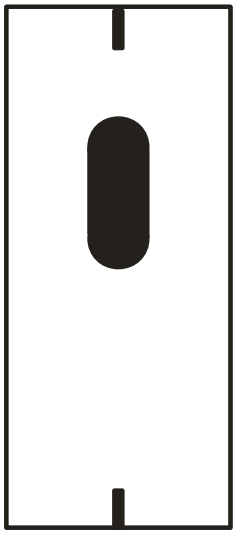
When forging your blade, the tang area behind the riccasso should not be forged thinner than the riccasso.



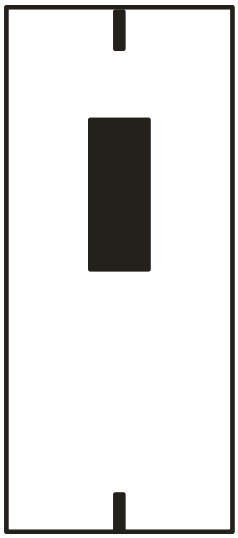
When grinding the tang, do not grind the 1/8" of the tang behind the riccasso. This area is finished at the same thickness as the riccasso and will be filed to press fit in the slot in the guard. I file this area to be .002" thicker than the guard slot is wide.



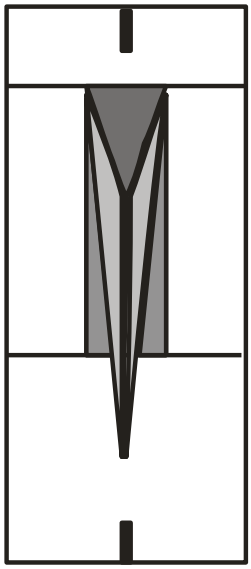
When making the guard, I always prepare the material by grinding it parallel on all sides. Then, I am able to locate the material accurately in the jaws of my milling machine vice. I place the material in the milling vice and center the end mill on the material. At this time, I make center marks at the ends of the guard material by lightly dragging the point of an end mill. I use a pointed end mill that I purchase from MSC to do this. The MSC part number is 0628814. I also use the pointed end mill to drill a hole through the material for the 0.187" end mill to enter. I then change to the .187" end mill and cut the slot the exact length of the height of the tang.



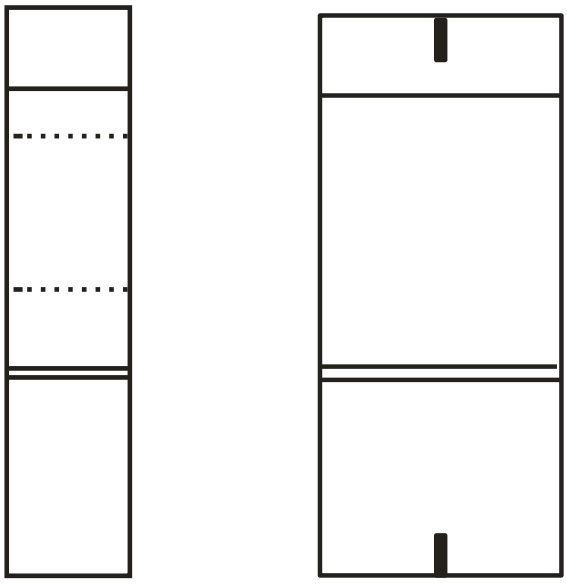
As I fit the guard to the tang, I square out the ends of the slot by using a file that has had one side ground "safe". The "safe" side of the file is held against the side of the slot as it is used to remove the radius' at the ends of the slot.



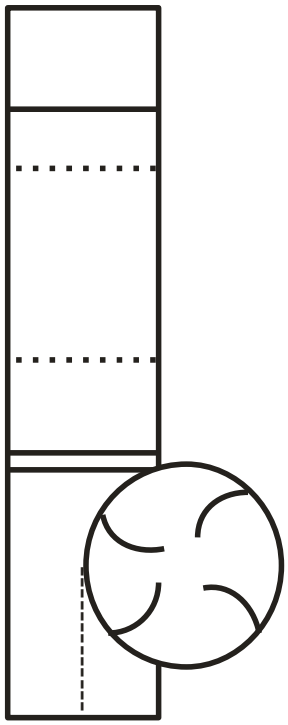
The blade is fitted to the tang and the guard material is marked for the top of the spine and the bottom of the riccasso.



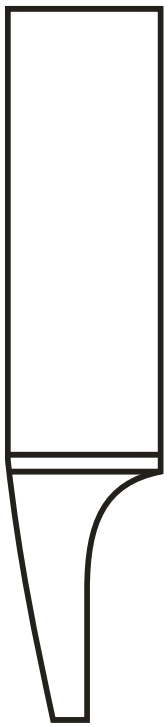
The line from the bottom of the riccasso is transferred around to the back of the guard material. And then another line is marked 1/32" (.031) below it to indicate where the guard will be milled to for the finger relief area.



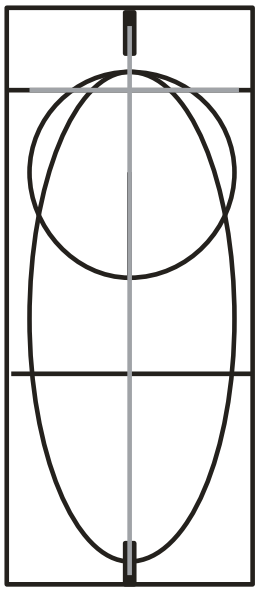
Using a 1/2" (.500) end mill, the guard material is cut away to the line that is 1/32" below the riccasso bottom mark.



I like to radius the front of the guard from just below the bottom of the riccasso, down to the bottom of the guard. I usually remove about half of the material's thickness at the bottom of the guard.



Now it is time to affix the guard pattern onto the guard material. I use stick paste glue (like grade-schoolers use)to glue the pattern onto the material. I just use the paste glue in the center of the paper pattern. The center line on the paper pattern is aligned with the center marks on the material. The horizontal line on the pattern is aligned with the line indicating the top of the blade spine.



I then use Super-Glue around the outside of the paper pattern. The Super-Glue holds the paper better than the paste glue and also binds the paper fibers together so they don't fray during the grinding of the material. During sawing and grinding of the guard material to the pattern shape, you have to have some patience. I haven't found any type of glue that can stand up to excessive heat build-up during shaping. So, when the piece heats up to the point that you can't handle it with bare hands, it is time to let it cool down.

After grinding the guard to the shape of the paper pattern, it is ready to install on the blade. The guard is press fit onto the tang, using epoxy to seal the joint between the guard and tang.