

Self-Alignment Mechanism for Hidden Tang Knives

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One of the aggravations (or perhaps opportunities, depending on your viewpoint) of being a bladesmith is the need for high-quality fit-and-finish. It is a truism that no matter how pretty the Damascus, no matter how well the heat-treating, if there are cracks and separations

between the elements of the knife, the value of the piece is significantly degraded. Consider the knife in Figure 1. The upper drawing (A) is the completed unit, the middle drawing (B) is

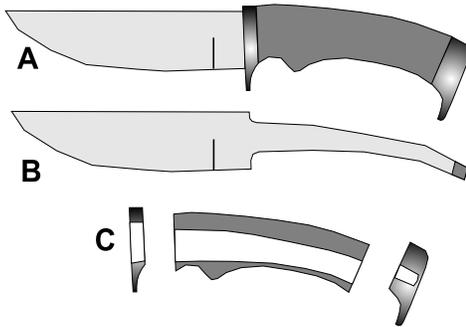


Figure 1: Overall design

one possible configuration of the blade, and the lower drawing (C) represents a cut-away view of the guard, pommel and handle. The guard and pommel pieces must smoothly fit against the handle section without gaps and the whole assembly must be solid. The question is how to achieve this without going batty.

In virtually any book on knife construction, there are descriptions of how to fit the guard to the blade, so we'll assume that has been done and that the guard-handle interface is reasonable. If, in fact, the cavity through which the tang passes is a bit over-generous, any slight gaps in the guard-handle interface may well vanish when the pommel is tightened down. Typically, you can pack the cavity with epoxy to remove that slop, so the real question is how to build the system so that when the pommel is fully tightened, it meets the rear of the handle without gaps.

A simple (well - maybe simple-minded) solution is shown in Figure 1. Thread the end of the tang with a 1/4 x 20 tap. This is *lots* of fun with a tool steel tang that is generally smaller in one dimension than 1/4". Using a #7 bit, drill a blind hole in the pommel and tap it with a 1/4 x 20 tap. It's helpful to have a blind tap available so you can run the threads almost to the bottom of the hole. You then fit the pommel to the assembled handle, note where the gaps are, sand the handle to compensate, and repeat. Of course, as you remove material from the handle, the orientation of the pommel will change with respect to the handle since the tang length is unchanged. If your pommel isn't radially symmetrical, i.e., circular in cross-section, the only practical way to do this is use a big enough block of material for the pommel so that when it is finally locked down, you can grind out the desired shape. Obviously, this procedure is a pain but it does work. Don't be surprised, however, if the pommel strips just as you tighten it down that last little bit or that the tang appears if you get overly enthusiastic when grinding down the end of the pommel.

The next variant is to buy a 1/4 x 20 coupling nut (essentially a 3/4" to 1" 'stack' of nuts), solder it to the inside surface of the pommel and bore out the rear of the handle so that the nut can be inserted into the handle. You could just drill and tap a piece of 3/8" round stock but since a coupling nut is a few cents, go with the nut. To minimize the size of the hole in the end of the handle, you can grind down the outer diameter of the nut (see Figure 2 for

a convenient tool to do this). The most secure way to attach the nut is to make a shallow (~0.050") depression in the pommel

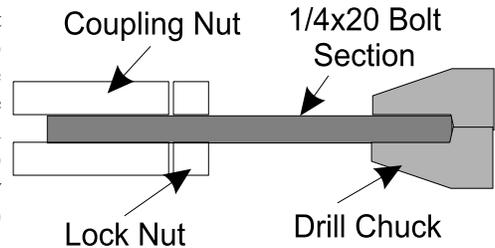


Figure 2: Tool for rounding coupling nuts

end mill, then braze the nut in place. This assumes that the pommel is brass or nickel silver. I've found that a solder joint may fail just at the critical moment. You can also cut off the last inch or so of the tang and arc weld a piece of 1/4" x 20 rod to it. That eliminates the problem of threading the tang but we still have the same problem of alignment of the pommel-handle interface.

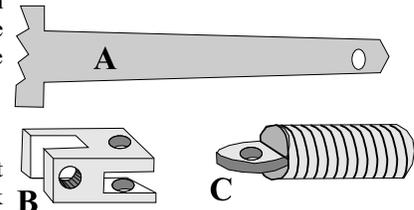


Figure 3: Universal joint

To eliminate that problem, think universal joint. Slot a piece of 5/16" square

stock as shown in Figure 3B. Grind down the end of the tang (A) and the end of a piece of 1/4x20 rod (C) so that they will slip into the slots. Drill 3/64" holes as shown and rivet with small lengths of 3/64" brazing rod. It helps to knock off the corners of the square stock after slotting but before riveting. You will also probably have to open up the cavity in the handle to allow the joint to slip through. If you firmly set the rivets, and bevel the opening of the brazed nut, threading the pommel onto the bolt section is not a problem. When tightened, the pommel's inner surface will now lie flat to the handle's end, no matter what the angle between the tang and the pommel. You still have to grind the pommel to shape.

There is only one more wrinkle - what if the pommel must lie at a fixed orientation to the handle and you can not shape it after attachment, i.e., a dagger

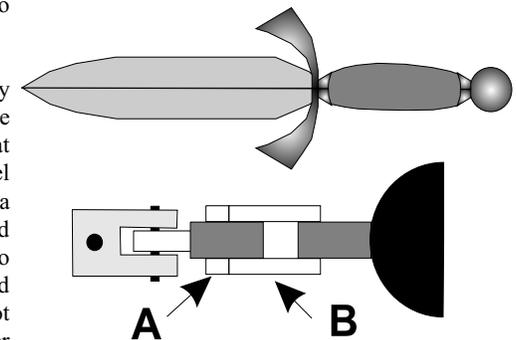


Figure 4: Radial adjustment

pommel as shown in Figure 4. All that is needed is to reverse a few of the bits. Place a lock nut (A) and a section of coupling nut (B) on the threaded end of the universal joint (both nuts having been rounded down to the same or smaller diameter as the joint itself). A section of threaded material is brazed onto the pommel instead of the coupling nut. Now, all you have to do is thread the pommel bolt into the coupling nut and tighten it down. If the pommel does not align properly, adjust the position of the coupling nut on the universal joint's bolt section, lock it in place, and try again. After a bit of adjustment, everything will align perfectly and you can have that beer you've been thinking about. A final comment - check out Brownell's EPOXY-BLACK PIGMENT (\$4.45, www.brownells.com). Mix this stuff into your epoxy and a multitude of minor flaws vanish into blackness.