Precision Grinding - the Blade Holder

Steve Bloom

If you are grinding a pocket knife - or a dagger - or a blade with a ricasso, you'll face the problem of plunge cuts and precision bevel grinding. If so, read on.

The optimal rig (IMHO) ought to have certain features - it ought to let you specify the angle of the bevel, it ought to let you grind both sides conveniently, and it ought to give you the control needed. What I came up with is a stable table

Figure 1: The Table

(Fig.1) with a flat surface that can be set to perpendicular to the belt and level to the floor. The Table consists of a plate of stainless (because I had it), two telescopic legs, and a central support rod (3/4" diameter). The angles and spacings are

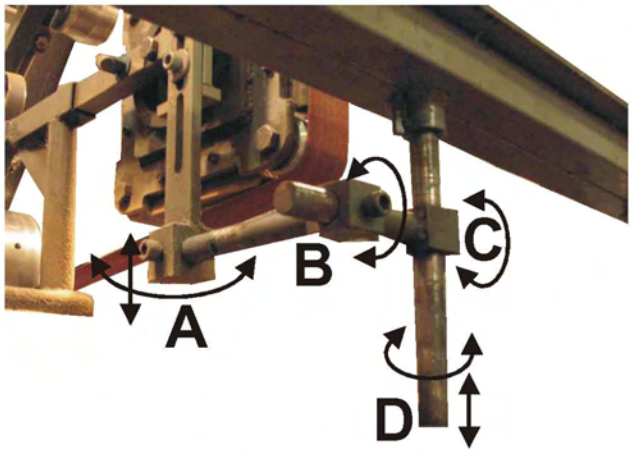

Figure 2: The steady rest

controlled by a steady rest attached to the grind arm of the variable speed grinder (plans will soon be available detailing how you can build one yourself). The rest is composed of three arms (Figure 2). Arm "A" attaches to the grind arm and can be adjusted up and down as well as at any angle in the plane of the grind arm (shown by the double-headed arrows). For this application, there is an auxiliary block of steel bolted to the top of the arm that locks the arm at 90° to the grind arm. At the bottom of the arm is a block of steel with a 3/4" hole facing forward and a lock bolt. Into that hole is inserted Arm "B" which has a similar block of steel on it's front end. Arm "B" can be moved back and forth and rotated in the block on Arm "A" allowing length as well as angle control. In the block on the end of Arm "B" is (you guessed it) - another arm similar to "B" that runs left-to-right. Arm "C" can move in the block on arm "B", thus allowing the block on "C" to be precisely placed at the center of the belt. Finally, then central rod of the table ("D") runs through the block on Arm "C". By appropriate adjustment of these arms, the table surface can be precisely adjusted so that it is square to the belt (a decent square helps here) and level to the floor (a 2' construction level help here). Once the table is positioned, the legs can be extended to the floor and locked in place. The result is a rock-steady working surface placed near the belt and perpendicular to it.

The next step is shown in Figure 3. A shoe is fabricated that

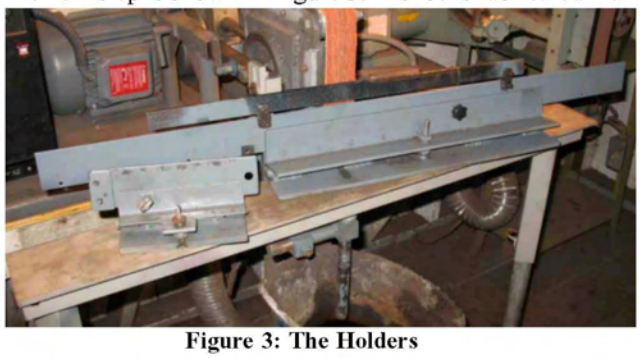

Figure 3: The Holders

can be freely moved on the table and yet locks the angle of the blade to the belt. The details are shown in Figure 4. There is a base plate to which is attached a hinge. On the other leaf

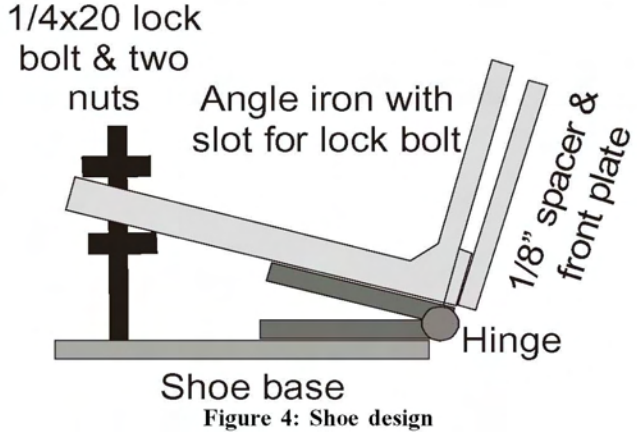

Figure 4: Shoe design

of the hinge is attached a piece of angle iron (2" x 2" is a convenient size). The angle has a 0.25" slot milled into the leg attached to the hinge at the center of the assembly. The other leg has a 1/8" thick x 1/2" spacer welded (or bolted) to the leg just above the hinge. A secondary plate (1/8" x 2") is added to the front of the spacer. A 1/4x20 bolt is welded to the shoe and extends through the slot.

You will have noted by now that I haven't said anything about the lengths of these components. For small blades, maybe 6" is right. For big blades, you might want something bigger, so it all depends on what you are making - and there is nothing that prevents you from making a bunch of these shoes.

Now comes the fun part - the item that actually holds the blade (Figure 5). The holders are all made of 1/8"

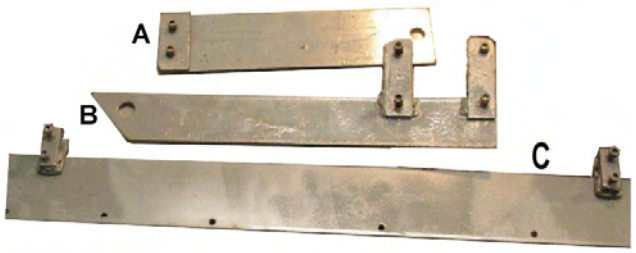

Figure 5: Blade holder designs

x 3" plate and all slip into the slit on the shoe. Holder "A" is the simplest - a few inches longer than the slot on the shoe with a strip of steel held to the holder by a pair of bolts. You slip the tang under the strip, level the blade relative to the holder and tighten down the bolts. This type of holder works well with small blades. The other two are useful for large blades. Type "B" has a

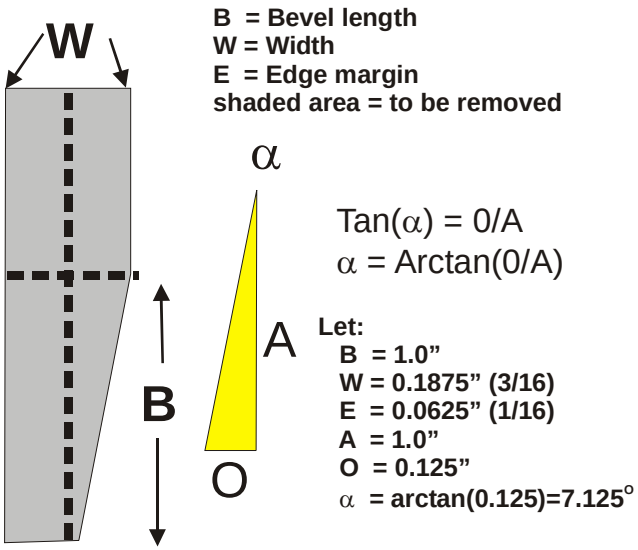

Figure 6: Angle calculation

pair of arms welded to the holder and has two strips of steel bolted to those arms. The tang is locked down by the strips and the blade can either be place over the body of the holder or it can protrude to one side of the holder. Type "C" is for long blades (like swords). The arms can slide along the spine of the holder into whatever position provides the best support and clamp onto the spine of the blade.

The angle is set by the thickness of the blade, the height of the bevel, and the amount of metal left at the edge (Figure 6) . Once you have the angle, it's a simple matter to put the shoe on a flat surface and use a protractor to set the angle.

Now the beauty of this design should become apparent. The shoe is placed to the right of the belt, the blade is placed (edge up) in the holder with holder in the slot and the tip of the blade to the left. The left bevel can be ground. When it's time to do the other side, just flip the holder over to put the tip to the right (edge still up), and move the shoe to the left of the belt. If the holder is symmetrical and the blade centered in the holder, you can even grind daggers (Figure 7).

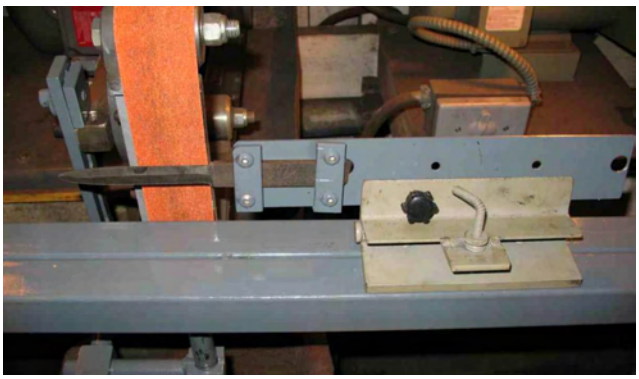

Figure 7: Grinding a dagger

Shop Tips

Phil Collins

At the conference Jordan clamped a porta-saw into a vise to use it as a vertical band saw. I thought that was pretty cool and a good way to save money and avoid getting a more expensive stationary band saw. I found this website that has another way to secure the porta-saw with even more stability and cutting table/guide area.

http://www.swagoffroad.com/Porta_band_Modular_Mount_Product.html