

50 Caliber Browning Machine Gun Pen Tutorial

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This tutorial presents instructions for making a 50 BMG pen with options including Cross or Parker style refills and a tracer bullet or turned wood tip. These options allow four different, but similar, designs to be made as shown. The upper two use the Parker refill and the lower two use the Cross refill.

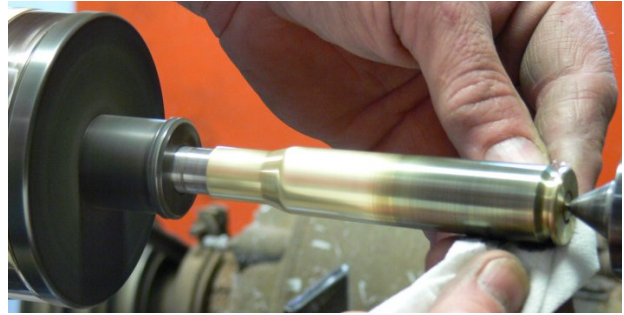


Initial casing preparation



The casings I get are 'once fired' and to various extents have tarnishing, nicks, dents, and out-of-round necks. Some of these provide 'character' and 'authenticity' to the finished pen. But, the out-of-round necks prevent the tips from freely turning. I size the casing neck using a setup which consists of: a drill press; a holder which grips the recessed ring at the base; clamps to fix the holder to the drill press table; and, a specially made tapered mandrel held in the drill press chuck. The tapered portion of the mandrel rounds out any dents in the neck and the straight portion resizes the neck so that a power coated bullet will turn freely without binding.

The casing is then mounted on the lathe using a mandrel and live center as shown. The mandrel extends through the casing with two o-rings set in grooves to grip the neck. The tip of the live center is placed in the dimple made by the firing pin and keeps the casing from sliding back and forth. My casings tend to have heavy tarnish which is quickly removed with 400 grit sandpaper. Successively finer grits followed by a metal polish will produce a nicely polished finish. Stopping at a lower grit, such as 800, will produce a brushed satin finish. The degree of finish achieved should be based on your (or your customers) preference. At this point the casing should be thoroughly cleaned to remove all residues which may interfere with the final coating that you choose to apply. I use a clear gloss powder coat for durability of the finish. If no coating is used, the brass will tarnish to a patina which can be removed, if desired, with any metal polish by the pen owner.



Once the casing has been coated according to your preference, it can be set aside. The tip assembly must be completed before the interior portion can be properly sized.

At this point you will need to decide whether you will use the bullet or turned material and which refill to use. The tip assembly instructions will be based on the material used and will include both refill choices.

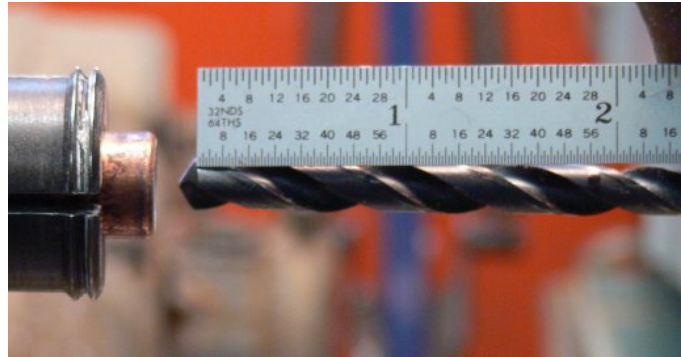
Bullet tip

The bullets I use are tracer rounds. They have a lead plug surrounded by a steel/copper jacket with the tracer material at the back end. The tracer material is similar to a flare. When ignited it is intensely bright, incredibly hot and can't



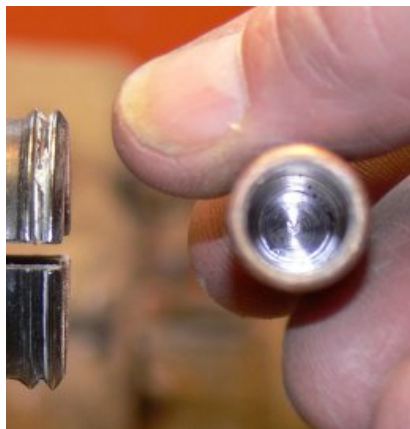
be extinguished. But, it can be safely removed by drilling since the drill bit does not get hot enough to ignite it.

To remove the tracer, drill a hole of the proper diameter to the recommended depth. Measure the depth from the beginning of the flutes as shown in the photo.



For a Cross refill use a 3/8 inch drill bit and a depth of 1 5/16 inch. For the Parker refill use a 10 mm or 25/64 inch drill bit to a depth of 1 3/8 inch.

Because lead is very soft, it tends to stick to drill bits. Trying to drill the small hole for the tip of the refill can easily break a small bit. Removing the lead first alleviates this problem. It also eliminates the safety (environmental) issue of having lead in the tip of the pen. Most of the lead can be removed by drilling with a 1/4 drill bit to a depth of 1 7/8 inch. The rest can be removed by heating the bullet with a propane torch until the lead melts out. You may here a small pop when expansion of the lead causes it to release from the jacket. If this happens, the lead may pop out as a small plug. Although drilling is not absolutely necessary, it does reduce the amount that must be melted out.



View after drilling out the lead



Melting out the remaining lead



View of the bullet after the lead is removed

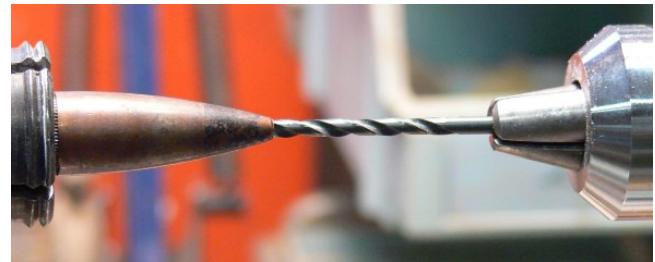


After the bullet has cooled, the insides can be cleaned out. There will be some residue of the tracer seal in a groove near the base and some lead flash may still be inside. These can be removed using any small pointed tool to scrape them out.

Looking inside the bullet at this time will reveal that the tip is flat and larger in diameter than the hole needed for the refill. Therefore drilling from the backside is likely to produce an off-center hole so drilling from the front is necessary. Mark the location to drill the tip hole using a sharp center punch. Mount the bullet in the lathe and drill the tip hole using a #44 drill bit for the Cross refill or a #35 drill bit for the Parker refill. Note that the drill bit for the Parker refill is nearly as large as the tip, so the center punch must be done as accurately as possible. An off-center hole can be reshaped by filing the tip to a symmetric shape but does run the risk of exposing the steel inner jacket, especially for the larger hole.



Drilling for the Cross refill



Drilling for the Parker refill

Cleaning up the outside can be done by using one of two methods:

- 1) Remove the paint using acetone (best done before melting the lead) then use a metal polish to brighten the surface. This can take some time depending on the amount of tarnish present.
- 2) Removing the paint and tarnish by sanding and polishing. To do this, I mount the bullet tip first in the lathe and sand the straight portion with 400 and 800 grit sandpaper. This portion will be inside the casing during use so a smooth satin finish works fine. Remount the bullet with the tip out and sand with 400, 800, 1500 grit sandpaper followed by polishing with a metal polish. This will result in a highly polished finish.



The amount of polishing is a matter of preference.



At this point the bullet should be thoroughly cleaned to remove all residues which may interfere with the final coating you choose to apply. I use a clear gloss powder coat for durability of the finish. If no coating is used, the copper will tarnish to a patina which can be removed, if desired, with any metal polish by the pen owner.

Once the desired finish has been applied, clean out the tip hole with the drill bit and proceed with the working portion of the tip assembly. This part of the assembly is significantly different for each refill, so will be presented separately.

Completing the Parker refill bullet tip assembly

I use the interior pieces from a Cigar pen kit for the working portion of this tip assembly. Roughen the surface of the lower tube and glue into the bullet, I use thick CA, so that 11/16 inch of the tube extends out of the bullet. This length is based on using a tracer round. If you are using a different type of round, then you will need to determine how much extension is required so the overall length is the same as the tube and tip of the cigar kit. Do not insert the tube and try to wick the CA into the joint as some of the CA will run out the bottom and clog the tip hole requiring you to ream out the hole again. The cigar kit uses a threaded fitting pressed into the lower tube which the transmission is screwed onto. The outer diameter of this fitting is too large to fit into the neck of the casing and needs to be turned down. Originally, I turned away most of the shoulder but had to use a portion of the upper tube for the flange to ride against for strength. Now I only turn away enough of the flange to allow it to enter the neck easily. Press the fitting into the tube until the flange is seated against the tube. Then install the refill and screw on the transmission. Continue with 'Making the dowel insert for the Parker refill'.



Turning down the flange



Completed bullet tip assembly for the Parker refill

Completing the Cross refill bullet tip assembly

I use the interior pieces from a slimline pen kit for the working portion of this tip assembly. Take a $\frac{1}{2}$ inch dowel and cut off a piece $\frac{3}{4}$ to 1 inch long. Drill a center hole with a 7 mm drill bit. Roughen the surface of one of the tubes and glue into the dowel leaving a little more than $\frac{1}{2}$ inch protruding from the end. Mount the tubed dowel on the lathe and turn to $\frac{3}{8}$ inch diameter so that it is a **snug** fit in the



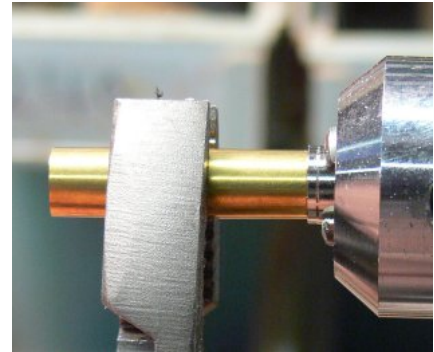
bullet. If the tube is not centered in the bullet, the bullet will wobble when retracting and extending the refill which will cause it to bind. Press the dowel/tube into the bullet so that $\frac{1}{2}$ inch of the tube extends beyond the bullet. The lengths stated are based on using a tracer round. If you are using a different type of round, you will need to determine the required lengths so the overall length is the same as the tube and tip of a slimline kit. Drizzle thin CA onto the end of the dowel, but not too much. The CA will soak into the wood and bond to the bullet. If too much is used some will run out the other end and clog the tip. Press in the transmission until the center of the groove is even with the end of the tube. Install the refill and continue to 'Making the dowel insert for the Cross refill'.



Completed bullet tip assembly for the Cross refill

Making the dowel insert for the Parker refill

You are going to need the 'cap' tube which engages the transmission. On the kits I have it already has the cap fitting, clip and cap attached to it. If yours doesn't, you can skip this part. If it does, it needs to be separated. To do this, unscrew the cap and remove the clip. Place the fitting in a drill chuck and pull the tube out by wiggling it with a pair of pliers. A slight dent or out-of-roundness in the tube is not a problem as long as it can still engage the transmission.



Take a length of 1/2 inch dowel and insert it into the casing as far as it will go. The end should bottom out on a tapered surface near the base which centers the dowel. Mark the



end of the neck on the dowel and remove the dowel. Place the completed tip assembly alongside the dowel with the mark lined up with the wider groove on the bullet. This is where the end of the neck will be when completed. You can choose to expose more or less of the bullet by placing the dowel mark where you want the end of the neck to be. Mark the dowel with the location of the backside of the flange. Cut the dowel at this mark. This represents the length needed to correctly position the bullet in the final assembly. Mount the dowel in a

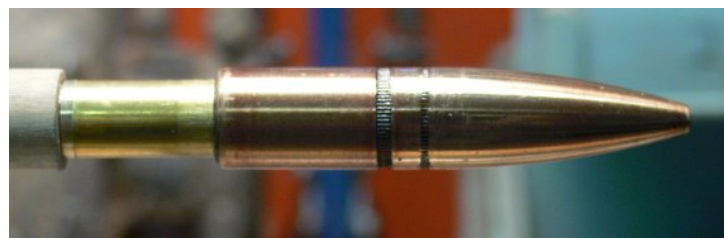


centering chuck and drill a hole through it with an "O" size drill bit. Then drill a 3/8 inch diameter recess about 1/4 inch deep.

Press the cap tube into the insert so the end of the tube is even with the bottom of the recess. Drizzle a little thin CA on the wood surrounding the tube to bond it in place.

Take a short length of 3/8 inch dowel and glue it into the recess to seal it off. Cut the

dowel flush with the end of the insert. Test the fit by inserting the tip assembly to verify that it seats flush with the insert and the transmission rotates freely. If not, enlarge the diameter or length of the hole as



needed. There is no problem if the insert is a little off-center with the tip assembly since the end of the insert will be centered in the neck in the next step. Continue with "Completing the casing'.

Making the dowel insert for the Cross refill

Take a length of $\frac{1}{2}$ inch dowel and insert it into the casing as far as it will go. The end should bottom out on a tapered surface near the base which centers the dowel.



Mark the end of the neck on the dowel and remove the dowel. Place the completed tip assembly alongside the dowel with the mark lined up with the wider groove on the bullet. This is where the end of the neck will be when completed. You can choose to expose more or less of the bullet by placing the dowel mark where you want the end of the neck to be. Mark the dowel with the location of the backside of the flange. Cut the dowel at this mark. This represents the length needed to correctly position the bullet tip in the final assembly. Mount the dowel in a



centering chuck and drill a hole through it with a 7 mm drill bit. Then drill a $\frac{3}{8}$ inch diameter recess about $\frac{1}{4}$ inch deep.

Glue the remaining tube into the insert so the end of the tube is even with the bottom of the recess. Take a short length of $\frac{3}{8}$ inch dowel and glue it into the recess to seal it off. Cut the dowel flush with the end of the insert. Test the fit by inserting the tip assembly to verify it seats flush with the insert and the transmission rotates freely. If not, enlarge the diameter or length of the hole as needed. There is no problem if the insert is a little off-center with the tip assembly since the end of the insert will be centered in the neck in the next step. Continue with "Completing the casing'.



Completing the casing

Verify that the length of the insert is correct by fully seating the tip assembly into the insert and inserting this combination into the casing. The amount of the bullet showing will be the same as the end result. If you want more or less of the bullet to be exposed then adjust the length of the insert before proceeding. Remember, the back plug is only $\frac{1}{4}$ inch long. Do not take too much off this end or the epoxy that holds the insert in will be forced up into the tube and interfere with the refill. Remove the insert and tip assembly keeping them together as a single unit. Mix about 4 cc of epoxy (about $\frac{1}{6}$ of a typical package of epoxy) and place it in the bottom of the casing. If any gets on the neck area it **MUST** be removed before continuing. Push the insert and tip assembly into the casing so that the end of the insert reaches the bottom of the casing. You can see your progress by observing how much of the bullet is exposed. Let stand until cured. The tip assembly will center the insert's tube. The picture shows how the Cross insert looks when properly aligned in the casing, the Parker insert will be a little lower. The amount of epoxy used should be sufficient to permanently hold the insert in place. But if you want extra support, stuff small bits of paper towel around the insert and soak with CA to form a bridge. When all is fully cured, test the operation of the pen. If there is any binding when extending or retracting the refill, sanding the inside of the neck or the outside of the bullet **BEHIND** the insertion point will provide additional clearance.



Wooden tips

Wooden tip assemblies are fairly simple to make. Select the wood you will use and cut off a 1 (Parker) to 1 ½ (Cross) inch long piece. Drill a hole for the lower tube using a drill bit appropriate for the refill chosen. Glue in the tube so the blank extends beyond the tube slightly on one side. Square up the end of the blank. Mount the blank on the lathe using an appropriate bushing at the tip end. Rough turn the blank. Measure the neck of the casing to determine the inside and outside diameters. Turn the blank to the desired shape and length. Turn a tenon to the inside diameter of the neck and about ¼ inch long on the end away from the tip. Apply the finish of your choice. Check to make sure the tenon fits and turns freely in the casing. Press on the appropriate tip for the refill. Mount the transmission fitting (Parker only) and the transmission as instructed in the section on bullet tips. The casing insert and remaining

steps are the same as for the bullet tip assemblies except the insert does not need to be as long. There should be some gap between the tenon and the insert to prevent binding.



Comparison of bullet and wood tip assemblies