Modifying Moulds

Holler Pints….

In the 44 years I have been casting, I have looked at many moulds. Some of the ones that have intrigued me most were the Lyman factory hollow point moulds. In 1958 when I started casting, Lyman offered any mould they made as a hollow point by special order for the ridiculous sum, even then, of $5. As a teenager, my budget allowed very few mould purchases let along getting a coveted hollow point mould made on a special order.

Several years later, I was financially able to order a 452460HP and a 311410HP. These two moulds were used for years in various 45s and a 30/30 Model 94.

Time has past and 23 years in the Army separated me from those moulds and finally retirement was here and I had the time to tinker with moulds as I have always wanted to. I was assisted in these wanderings of mould modifications by Mark Miller (Orygun Mark) (also a hollow point fan) and Larry Taylor, one of my shooting partners and a master machinist.

At present I have 51 hollow point moulds and plans to make many more before I'm through. Some are Lyman factory HP moulds and the remainder consists of moulds Larry has modified for me.

I can truthfully say that every mould I have hollow pointed has shot better than the original configuration or "solid", as I'll refer to them.

Modifying a mould for a hollow point is no mystery. It does take some fairly good equipment, a good eye and a fine sense of craftsmanship.

First, you must start with a good mould. It must be free of burs, must have the index pins fitted properly and must not be warped. It can be either single cavity or double cavity as either work well and I have some of each in my accumulation. I suppose a 4 cavity would work also but that's a lot of weight to swing around.

The next requirement is a good lathe with a four-jawed chuck or else a mill. Larry uses a CNC mill in his daily job and is an expert with it.

On a DC mould, plan ahead as you'll have to drill the bottom for a cavity pin stop screw and this hole shouldn't interfere with the index pins which are already in the mould. We usually use the cavity that is away from the hinge pin on a DC Lyman.

Here are a few thoughts on cavity pin diameters. Most Lyman moulds use pins that correspond to available fractional drill sizes. I tend to use a smaller hole than most as I like a nose with walls that don't look fragile and some of the factory Lyman moulds give this appearance. The "Devastator" hollow points currently marketed gives me this impression.

Normally used pin diameters.

Pistol	**Caliber**	**Pin Diameter**
	.30	.100
	9mm/38/357	.125
	41/44/45	.140
	44/45	.156
Rifle		

	.22	.070
	.25	.078
	.32	.100
	.35	.125
	.375	.125
	.44 and above	.140

The first step is to strip the sprue plate off the mould and put the mould in the machinist's vise. Then adjust the mould with a dial caliper or "dial it in" to find the center of the cavity by chasing the top edge of the cavity. Once this has been done and rechecked several times, you're ready to start moving metal. The hole is started through the cavity with a start drill and then followed up with a pilot drill that is smaller than the desired cavity pin diameter. Then this process is followed with a drill that is slightly under the finished dimensions of the cavity pin. Finally, a reamer is used to finish the hole and smooth it.

The next step is to drill and tap a hole in the bottom of the mould for the cavity pin stop screw. This is normally a large headed 10-32 screw. This operation is best left until the hollow point pin assembly has been made and then spaced to fit correctly. If using a pin for a stop, a second hole must be made to act as a stop for this pin. Normally, this will be a 3/32" spring pin and no tapping is required.

The next step is to make the hollow point pin assembly.

Home made hollow point pin assembly with E clip

Normally, we mount the pin in an aluminum shaft that is .250 X 1" and bored to fit the appropriate pin we're using. We have had very good luck in using aluminum stock for this application. I use .250 X 1.0" threaded spacers from the hardware and these work for all but the smallest pins.

Knobs are another matter and we normally use wooden drawer pulls for this and they work fine. Lately, I've been buying round wooden knobs from the hobby section at Wal-Mart and turning them to the approximate shape of the Lyman factory knobs. These have a flat already on one side and are drilled for a 10-32 screw. I use a 10-32 screw through them with a lock nut and turn them down with a hand ground chisel.

Hollow point pin assembly with turned knob to approximate a Lyman style

There are two methods of making a retaining system for the cavity pin and Lyman has used both in the past

The first is to add a pin, which fits under the head of the cavity retaining screw and stops against a small solid pin. This method requires the drilling of an additional hole but works a little better during casting in my opinion.

The second method is the use of an E clip-retaining ring, which fits under the head of the cavity pin retaining screw. This requires a lathe for turning the ring and it tends to pop off occasionally during casting causing the caster great stress when he attempts to find it as it's spring loaded somewhat.

Now, we come to making the actual pin for the hollow point. We have used hardened dill rod in the appropriate diameter with good success. This is hard to work and requires access to a supported grinder. I prefer to use water hardened drill rod, as it is soft enough to work with a file with the pin in an electric drill. If a lathe is available, use it but be aware of "spring" in the pin on diameters below .125". Brass rod is also useable and makes a good pin. How long it will last before wearing remains to be seen.

Measure the required amount of pin. Our rule of thumb is that you want the cavity pin to extend halfway through the length of the bullet. You can decide what you want but this seems to work well. Lay the rod in the mould half, select what you want the cavity depth to be and allow at least ½" to extend below the mould and cut to length using a Dremel tool or other cutting device.

The "cavity" portion of the pin is then slightly tapered for good release and then finely polished with crocus cloth. At this time, insure that the pin smoothly enters the hole you have made in the mould for the pin. It may be necessary to reduce the diameter so that it will enter smoothly. At first I was apprehensive about the fit but I have used pins that were .003" in diameter smaller than the hole and had no flashing so this is not as critical as it might seem. But, we're looking for some workmanship here.

Now, take the .250" X 1" shaft. Drill it lengthwise to the diameter of your pin. Again, this is not critical but we want it to look like something. Insure that your pin is a sliding fit in this hole in the shaft. Next, I tale a drill and drill a small hole in one side of the shaft abut 1/16" from the end. I'm now assuming we're using a pin/screw for the cavity pin stop. This will be for drilling and tapping a 4-40 screw so use the appropriate sized drill. Next drill and tap the hole to 4-40. Now, take your pin and insert it in the mould half and set to the desired depth. With the shaft on the pin, mark through the 4-40 hole with a fine pointed magic marker or machinist's scribe. Take a Dremel tool with a rotary disk and cut a small notch in your pin at the marked point to accept the end of a 4-40 screw. I have found that by placing a second 4-40 screw about ¼" below and rotated 90 degrees from the first, additional security is provided against pin slippage. Then take 4-40 screws .500" in diameter and secure the pin to the shaft using the notch you cut with the Dremel tool to lock the two together and tighten. Cut off the screw head about ¼" out from the shaft. The bottom screw, if you elect to use this arrangement, and I highly recommend it, is cut off flush.

The next step is to take a .250" drill and drill the wooden drawer pull about 3/4s of the way through to accept the shaft. Once this has been accomplished, insert the shaft and insure that it is well seated.

Again, we'll use a 4-40 screw .500" long to attach the shaft to the wooden knob. Drill through the wood and shaft and drill and tap to 4-40. Using a drill larger than the screw head, counter bore this hole in the wooden knob so that the head will be below the surface. Saves burned fingers later.

Now, you've completed the hollow point pin assy.

The next step is to locate the stop screw on the bottom of the mould and drill and tap. This is best done so that the end of the 4-40 screw fits right under the head of your 10-32 machine screw and clears the screw body. Once this is done, drill a hole about ¼" deep for the spring pin that acts as a stop. Tap this pin in and cut to length with a Dremel tool.

At this point, you will need to kind of fit the stop screw length, stop pin height and pin length in the shaft where they work together to insure that you have a smooth but friction fit so that your pin remains stationary in the mould when you're dropping lead. Do just a little grinding here and there will be a good a good fit.

If you're using the E-clip retaining arrangement, don't drill the hole for a spring pin, as the E-clip doesn't require it. For the E-clip, turn a groove on your aluminum shaft about 1/8" from the mould bottom and adjust your cavity pin stop screw length to accommodate the E-clip. If the E-clip is used, a separate hole will have to be drilled and tapped to lock the shaft and pin together with a 4-40 setscrew in the manner described above.

If all fits and works smoothly, you're ready to cast.

For the first several casts, I spray the pin with moly. This insures good release. If the pin continues to show hard resistance after a few casts, it is either warped or has rough spots. First take the pin out and attempt to polish. If this is not successful, work on the pin with your file and drill and re-polish. If this is not successful, try another pin. Last but not least, you've drilled the hole in the mould off center but this is hard to do.

Hopefully, it will turn out great hollow point bullets.

We just tried a new method of drilling which seems to work well for modifying the smaller caliber bullets.

The subject was a 257312 SC mould that I wished to modify with a .078" pin. Since this small diameter drill will tend to "walk" in drilling through a mould bottom that large, it was decided to drill through the cavity with a .078" drill, reverse the mould and come back in from the other side with a .125" drill. We did this leaving an approximate 3/16" section of the mould with a .078" opening. This requires a stepped pin. This is much easier to fashion than stepping a pin and attempting to match the stepped shoulder with the opening at the nose of the mould and results in a very neat and clean hollow point cavity in the bullet.

Removing GC Shank

The first thing in removing a gas check shank is to decide if this is really what you want to do. Gas checks are used for a reason on a design but if you're like I am and don't "hot rod" your loads in revolvers, there's little use for them and the darned things are getting expensive. If you decide to remove the check, it can be done with a good drill press, or better yet a vertical mill, or even easier, an EDM machine if you have access.

Most of us will have access to a drill press so we'll look at that first. Obtain a drill bit that's the same diameter as your bullet diameter or SLIGHTLY larger. Take the mould to be modified and stone it and align the pins after removing the sprue plate. Firmly clamp it in a machinist's vise and dial in the center of the cavity off the chuck. Insert your drill bit and lower and raise the bit and set the stop. Do this several times as you're not going to get but one shot at making it right. After you're satisfied that it's lined up, lower the drill and touch the cavity edge. Back off and insure that it's aligned. If so, slowly make your cut, insuring that you don't go too deep. This should have been done when you set the stop.

Cast a few samples and see what you've done. The base band diameter should be the same as or no more that .002"

larger than the other bands. A drill press is not the tool of choice here as many have run out that exceeds the dimensions that we're looking for but you can use them if nothing else is available.

The next method we'll discuss is with the mill. In this case, a CNC mill is used. Prepare the mould in the same manner as with the drill press. Dial the cavity in and set the coordinates for center. Insert the cutter and set the depth. Dial in a smaller diameter and do a test run. Increase the desired diameter until the cutter makes contact with the GC shank. Stop and insure that the cut is consistent on all sides of the cavity. About 75% of the moulds I've seen done were slightly out of round so don't sweat this too much is there's a spot that's hit fairly lightly. If all is well, increase the cut .001" at a time until you've gotten the diameter you want. I recommend .001" over what the bullet should be. In the case of the .44 Magnum, I shoot for .432". This procedure should remove your shank and the mould should cast and shoot well. We did a 429244HP for Shuz and it turned out to be one of the most accurate .44 bullets I've shot in my Ruger Super Blackhawk.

The EDM is even easier. Prepare the mould in the same manner as for the other two operations. Lower the electrode and it will interrogate the cavity edges and find center and lock the coordinates in. Set the depth. Make false passes until it contacts the edges. Check again for alignment. Increase the size to the point where you want it and you should get a good shank removal. I've only seen this process used several times so I'm not familiar with all of the intricacies of it. I did see it used to open a .429 sizing die to .432 and the resulting inner portion of the sizing die dropped out as a thin perforated sleeve about .002" thick. I was impressed by the accuracy of this process and can see where it will be a benefit to casters in modifying tools.

Modifying Bands

All of us seem to be looking for the elusive "full diameter driving band" Keith bullet these days. Many of the #358429 and #429421 moulds made in recent years drop bullets having undersize driving bands. According to Elmer this is a no-no and I've found his advice to be good over the years.

Lapping is one process that is used to correct this but I'm not a big fan of lapping.

I'll normally use steel bolt in a drill press.

I'll prepare a bolt with the head turned to the thickness and desired diameter of the band I want to enlarge. I'll then set the cutter in the drill press and set it at very low speed. I'll hit each side of the mould cavity lightly a couple of times until the mould halves almost touch. Then I'll insert the cutter in the mould and hold the mould halves closed for only a couple of turns. This is normally enough to open the band up .002-003". Cast and repeat until the desired diameter is reached. We're only looking for .0015" on each side here and that's only about the thickness of the bluing on the mould cavities. So, caution's the word here.

You'll notice that I haven't used any abrasive. The steel screw will cut the meehanite without any abrasive and you'll end up with sharper corners than with lapping.

Another problem we sometimes face is an undersize gas check shank, which allows the check to fall off. This can be cured in the same manner. Turn steel bolt to the inside diameter of a gas check. Slowly rotate it in the cavity until the mould halves fully close. This should open the GC shank to the point where it will stay on after sizing. Again, use no abrasive.

These are some of the tricks and procedures we utilize for modifying moulds. Your skills as a workman and the tools you have available will determine how successful you are in accomplishing them. I use them and I take my time at the process. One thing to remember is to go slow and measure twice. Once metal's gone, it's very difficult to put back.

Good tinkering.

John Goins/aka beagle

HP Bullet Moulds

I've always liked casting and shooting hollow pointed bullets. Many of the designs I wanted to try out were not readily available and even if I found them on E-Bay or at a gun show, prices were premium.

Being cheap, I decided to start hollow pointing bullet moulds. I started by looking at the different designs of Lyman, Cramer and Lee. I decided to improve on what I felt was either too big or small of a cavity. Lee and Cramer used a sharp angled pin so the bullets would fall off easily and Lyman used a long narrow pin. This was before the Lyman devastators came out. My first try was a 311314. I decided I wanted a .030" minimum wall thickness on the nose. I chucked the mould up in my lathe, dialed in the center of the cavity and drilled it out with the proper size drill. I used a .196" drill bit.

I have blank drill rod in various sizes so I used some 3/8" diameter and turned down a step pin. I gave it a slight taper and then cut a groove for a C-clip. I had a problem with the C-clip popping off easily so I brazed it on. The C-clip goes under the head of an 8-32 screw head and is used to hold the pin assembly in the mould during casting. I then made a handle from a drawer pull. It worked okay but I wanted a better method as one mistake using this method and I had to start over on the pin.

I then decided to make a pin for whatever size the hole was. This was a little easier and less apt to mess up. Then, I would attach it to the 3/8" stock.

I drilled a hole thru the 3/8" stock the same size as the drillstock. I then brazed it in place. This was a mistake as it hardened the drillstock and made it hard to cut the groove for the C-clip. So I learned to do the groove for the C-clip and drill the holding hole and then braze the pin in place. It worked much well.

The next design was to through the 3/8" stock and then cut the groove for the C-clip, drill and tap for a 6-32 setscrew to hold the center pin in the stock. Once the pin was at the right place I tightened the setscrew to mark it and then loosened and remove the pin. I then ground a flat the same size of set screw and re-insert the pin. I tightened the setscrew and it was done. This way the pin can be lengthened or shortened later.

Another method I use to hold the pin assembly in place while casting is about the same as for older Lyman factory hollow point moulds except the setscrew used to hold the pin is longer and goes under the head of an 8-32 screw. Lyman uses a solid, round pin for this application in their factory moulds. I use 600 grit wet and dry paper to polish my pins as very slight tool marks can cause bullets to stick and make it hard to remove the pin. You can also use jewelers rouge if you want the finest finish possible.

I use either roll pins or set screws to hold the knobs onto the pin assemblies. Occasionally. I'll make one and attach the knob using a countersunk screw through the knob into the 3/8" diameter shaft, which I've drilled and tapped.

On the cavity pin diameters. I use .060" for 22 caliber moulds, .100-.120" for .28-32 caliber moulds, .120- .150" for .35 caliber moulds, .150-.200" for .41-45 caliber moulds. One of the factors I consider is depth of lube grooves, Deep grooves will cause me to use a smaller diameter pin or a shorter pin. I chose to use drill rod stock as it is readily available, cheap and is easily machineable. Just remember not to apply heat before you are through machining it.

The depth of my pins varies from ¼ to ½ of the bullet length.

Another method I occasionally use for drilling the holes in the mould blocks requires making a drill guide that fits the mould cavity and automatically centers the drill bit. It is then easy to drill the mould on a drill press and not have the

drill bit wander. You have to put downward pressure on the drill guide while drilling or it will walk upwards. I normally put some small o-rings on the outside of the drill guide to help hold it in place and force it to center.

I have also make modified pins for HP moulds that will allow the original nose shape to be made or a different nose. An example is a 358311 with a FN instead of a RN. I can also make a HP with that same mould.

Occasionally, I'll make interchangeable pins for Cramer moulds for HP and other nose shapes. The Cramer moulds use a sliding HP pin on 2 sliders that you tap when you open the mould.

When I want to remove a GC shank from a mould, I grind a drill bit to the diameter I need and make the end almost flat instead of tapered. I then set my drill press stop carefully and drill out the GC shank. I can control the drill better this way. My mini-boring bar for my lathe has too much spring for my liking.

Like Beagle I have found HP bullets usually shoot better than their "solid" counterparts.

Mark Miller/Orygun (CRAZY) Mark