Occasionally our precision bolt action rifle may start to have sudden unexplained accuracy issues. Often overlooked are the erosion forces on the muzzle brake which can cause the bullet clearance holes to “tighten”. We have all seen carbon build up in our muzzle device and this absolutely will cause accuracy loss. But if that accuracy loss remains after a good carbon removal cleaning we need to look deeper.

I first encountered this in 2008, when a new customer sent in a specialty pistol in 6.5x284. After 200 rounds his groups had opened up well over an inch and he was requesting me to fix the issue. After a quick inspection of action screws, rings and bases, and a bore scope barrel inspection, I turned my attention to the muzzle brake.

Clearance holes through muzzle devices should be at least .020” over the bullets diameter, so with a few pin gauges I attempted to measure the holes. This particular brake had less than .005” bullet clearance. Upon closer inspection I could see that the brake was opened up .025” over bullet. But the effects of gas and powder blast on the baffle surfaces had created a bur on the leading edge of each clearance hole. That bur subsequently rolled into the leading edge of the thru hole causing a reduction in clearance.
The end result was a bullet that was being adversely affected as soon as it left the muzzle. My inspection also revealed that the original gunsmith used a brake that was of stainless steel of a non-heat treated variety that was softer than barrel steel. My later testing revealed that harder brakes tend to take longer for the erosion to occur to a point that accuracy is affected. I have also learned thru the inspection and construction of thousands of rifles and muzzle brakes that greater erosion occurs based on these other factors; short barrels, slow burning powders, and large capacity cases (which use slow burning powder) all tend to increase the erosion factor.

The solution;

Well really that starts during the brakes manufacturing and installation. Since that very first revelation of thru hole tightening, I have sought to combat the occurrences and what I learned in building muzzle brakes and testing processes has paid off.

Now I bore all my muzzle brakes to .030” over bullet diameter during installation. This helps slightly but the real key is to chamfer the leading edge of each baffles clearance hole with a 45 degree chamfer for about .015 of an inch. To properly explain the location of this chamfer picture each baffle that the bullet passes thru as a small funnel, I am removing the material that creates the bur. When the baffle is a perfectly flat surface the material around the clearance hole gets pounded by pressure and carbon residue, thus it deforms at the 90 degree edge and flows into the area of bullet clearance. By cutting this very small “funnel” the material does not get a 90 degree impact, thus it is much more resilient to deformation.

The process of chamfering the baffle holes is accomplished right after brake install when the clearance hole is being bored to its final dimension. I simply walk my HSS boring bar to the leading edge of each hole and cut the correct chamfer with the angle that is ground on the cutting surface of the tool. Done this way most brakes that are of 28 rockwell hardness will last the life of the rifle barrel, and longer, with no issues related to clearance hole erosion/burr creation.

Repair of an already damaged muzzle brake by the user;

This is relatively simple, slide a pop-sickle stick in the first port of the brake closest to the muzzle or remove the brake from the rifle. The intent is to simply protect the rifle bore and crown from the process of de-burring the clearance holes.

I take a ¾” brass rod with a slit in it to hold a small wrap of some 320 grit emery cloth. I then chuck the brass rod in the drill and hone out the clearance holes, which in the process will fracture off all the burs and get you back to your original clearance dimensions. This process may have to be repeated during the life of the rifle depending on barrel length and powder burn rate ect. That I outlined above.

So remember these tips if you’re having an unexplained accuracy loss that you cannot contribute to other accuracy gremlins.