

Superior Shooting Systems Inc.

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OVERVIEW AND INFORMATION
REGARDING THE USE OF FINAL FIN-
ISH AND TMS TO BREAK IN NEW
RIFLE BARRELS, PLUS COMPARI-
SON TO CONVENTIONAL METHODS

NEW BARREL BREAK-IN

AN ARTICLE BY DAVID TUBB

HIGH-
PERFORMANCE
PRODUCTS
engineered
by 11-time
NRA National
High Power Rifle
Champion and
6-time National
High Power Long
Range Rifle
Champion,
DAVID TUBB

TERMS TO KNOW:

Chamber: The portion of a barrel that is cut using a reamer; this is where the cartridge resides.

Leade/Throat: The area within a chamber that provides space for the bullet; this portion "leads" a bullet into the rifling.

Tool Marks: Visible imperfections left behind from the tools used in the rifling and chamber reaming operation.



OVERVIEW

When you purchase a new car, a prudent owner doesn't go out on the highway and drive 120 miles per hour to break in the vehicles motor. The vehicle owner's manual suggests varying speeds over the first 500 miles of life. Logic says that you wouldn't want to do this to your new barrel either, that is, go buy some full power loads, go out to the range, and just shoot the heck out of it.

When your new barrel shows up at your door it will exhibit tool marks in the leade/throat area. If your barrel is a factory barrel it can also contain any or all of the following: tool marks the full length of the rifled tube,

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smudge marks on the top and sides of the rifling from a dull reamer, voids, depressions, high spots, tight spots, burrs on the crown, variable land heights, off-center chambering and more.

If you have a new custom handlapped barrel, the barrel maker took great pains to lap perhaps 99-percent of all the tool marks from the full length of the barrel. He likely poured a lead-lap and worked it back and forth (reapplying abrasive mix on the lead-lap every so many strokes). Handlapping has actually put a two-directional finish on the barrel's interior (from pulling the lap back and forth) while the bullet will only be going one direction. In a nutshell, no tool marks of any significance are present in the handlapped un-chambered barrel.

Your competent gunsmith chambered this handlapped barrel with his (hopefully) sharp reamer with a floating pilot matched to your barrel. He likely even polished the large diameter (body wall portion) of the chamber in order to uniform and smooth it, which will aid in extraction of a fired case. He did not attempt to polish the lead area of the chamber (this is the portion between the chamber and the full height of the rifling). (If he used a solid pilot reamer to cut the chamber, you now have some slight tool marks in front of the lead/throat area on top of the rifling from the pilot not turning with the barrel.)

With the barrel turning in the lathe and the reamer held stationery, the chambering procedure has effectively put little "speed bumps" (tool marks) into the leade/throat area, much like how drilling a hole through metal typically leaves large, circular rings. These are found in every newly chambered barrel. These tool marks need to be smoothed out before the rifle will begin to shoot its best groups. One idea exists to go shoot the heck out of it with full power loads and never



look back, while others recommend the tedious process of clean and shoot, clean and shoot, clean and shoot, clean and shoot some more. The idea here is to send one bullet down a clean bore in hopes that it will remove the tool marks, but this process is going to take a while. I have seen several barrels broken-in using this method that still exhibited tool marks throughout the leade/throat, even after having been shot several hundred rounds.

Why did your custom barrel maker lap their product to begin with? This process was done in order to uniform the internal dimensions with the end goal being an accurate rifle barrel. Why wouldn't you want the same for the throat of your newly cut chamber?

After several hundred rounds, it's likely that the tool marks will have been removed from the leade/throat. However, during this same time/use period the barrel is now exhibiting a stress-cracking presence in the throat and down the barrel a few inches. This is normal and occurs in every barrel. (There likely could be cleaning rod wear marks appearing in the rifling too from all that cleaning — remember, shoot clean shoot clean shoot clean...) After several hundred rounds, you now need to think about some sort of scheduled maintenance on the roughened throat (from the fire/stress cracking). This is what **TMS** (*Throat Maintenance System*) was designed for. Use of this product is kind of like changing the oil on the car that you broke in correctly (and those first 500 miles/rounds came quickly) and is now being run/shot at high speeds (with full power loads).

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A rough throat in a barrel compromises the bullet jacket's integrity as it travels down the barrel (kind like all of those tool marks in the leade/throat when the barrel was new). When the throat becomes rough enough to tear or mar the bullet jacket the barrel's accuracy will deteriorate.

Again, one certainly doesn't want to start his new barrel off with full-power loads since high pressure and velocity equate to a fouled barrel (the bullet jacket material left in the barrel is not our friend). This condition is not conducive to accuracy, and, again, is kind of like driving that new car at 120 miles per hour from the start.

Two things need to occur for optimum barrel break-in —

FIRST STEP

Handlapped Barrel (use *TMS* kit)

Remove the tool marks in the leade/throat of the handlapped barrel. This can be easily done using 8 TMS bullets.

Factory Barrel (use *Final Finish* kit)

Remove most of the tool marks, imperfections, and reamer smudges in the factory barrel by using the first four grits of a Final Finish kit (compartments 1-4). That is done by firing 40 bullets loaded with a light starting-charge load from your reloading manual (lower pressure and velocity). Back to the automobile analogy: think of this as a "60-mph" propellant charge load not the 120-mph load... The first two grits (located in compartments 1 & 2) do about 70-percent of what is needed, and if I had only 20 shots to use these would be my pick.

All right, we have done the above according to the type of barrel we have. The barrel's tool marks are either removed or greatly lessened.

NEXT STEP

Handlapped and Factory Barrels

We now need to burnish in this now uniformed barrel.

"Burnishing" is the metal-to-metal finish that acts like a hone on a razor edge. It doesn't remove metal but smooths its finish and also, in a rifle barrel, orients the finish in one direction. Some relate this to a feathering effect — the feathers on a bird all lay the same direction for ease of aerodynamic flight. We burnish the barrel by shooting Final Finish #5 (bare) or your own handloaded bare bullets through the bore, best accomplished with the "60-mph" charge. This puts a finish on the barrel, which is conducive to minimize fouling. (This is now basically the process that all the clean-and-shoot group recommends — but they need to remove the tool marks first!)

During this entire procedure we are cleaning our barrel every 10 shots with a one-caliber oversized (next size larger: use .243 brush in a .224 bore, for example) brass brush and a copper-removing cleaner, such as Sweet's 7.62 Solvent. Keeping the brush saturated with the copper remover eliminates copper fouling so that both the grit-coated bullets and the burnishing bullets can do their job with maximum efficiency.

So once the barrel is now broken in and shooting well we need to continue our scheduled maintenance (back to the car, and changing the oil).

So every 300 to 600 rounds before you clean your rifle (300 for a fire-breathing caliber like the .264 Winchester, or every 600 for a normal capacity case such as a .308 Winchester). You shoot 2-3 TMS rounds down the barrel with your 60-mph load before you clean the barrel. Simple as that. This will help to keep the throat smooth and it will extend the accurate life of your barrel by approximately 30-percent. If you don't follow this regiment you can look forward to

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extended cleaning sessions and more fouling shots before the rifle settles down, as well as a shorter accurate barrel life.

We occasionally hear questions from people who believe that using this TMS treatment will advance the throat of their barrel, to which the response is —

I recently shot a brand new Schneider polygonal 6mm 5 land and groove barrel with a 3/4-degree leade. I measured the newly cut chamber's leade/throat with a dummy round with a 115-grain DTAC bullet, seated into the rifling, and recorded this measurement. I then fired 10 TMS bullets through the barrel and measured the throat advancement after the TMS treatment — the throat had advanced only 0.003 inches measured with same bullet/case as used before. Basically nothing changed except that approximately 98% of the tool marks in the leade/throat were gone!

On a factory barrel, you can expect your barrel's throat to advance with the 50 bullet Final Finish kit, but throat advancement measuring can be from inaccurate initial readings due to the dull reamer smudges having left high spots on the rifling in the throat. This condition is very commonly encountered. These **MUST** be removed before the rifling will even think about trying to shoot acceptable groups.

Many expound on using JB Bore Cleaner or a similar paste-type abrasive to lap in their barrels. JB is a very fine abrasive (probably around 1500-grit) and while it definitely will remove jacket material in a badly fouled barrel it is not a barrel's best friend. It is typically applied using an old brass brush wrapped with a tight-fitting patch (how well does this fit the barrel?). And once again we are feathering the metal two directions from pulling the rod in and out (the rod itself is probably doing a little lapping here and there on the throat due to its flexing in the barrel). Shooting TMS bullets down the barrel keeps the feathering running the same direction.

It is possible to get a jacketed bullet rifle barrel too smooth and see it foul worse. The reason is increased surface area contact and the effect is excessive metal-to-metal contact between the bore and the bullet jacket. This is why when a barrel is hand lapped the custom barrel maker starts off with a much coarser grit (typically 150-200). A barrel doesn't have to be completely devoid of tool marks in order to shoot acceptable groups, but it does require uniformity from breech to muzzle.