# A "Clean" Barrel



Illustration by David Labrozzi

A "clean" barrel shoots best, right? You should spend time and ammunition to properly break-in your new barrel, right? It's best to clean between groups, right? All these things we think we know.

## Not necessarily.

BY JOHN BARSNESS, Field Editor

Many obsessive riflemen "know" a lot of things about the insides of their barrels. They know they must break-in barrels and that any bore only slightly smudged by the passage of bullets will shoot less accurately compared with a barrel as clean as Aunt Josie's kitchen floor.

First, let's examine "proper" barrel break-in. According to just about everybody, this is accomplished by firing one shot, cleaning the barrel of all powder and copper fouling, firing another shot, cleaning, etc. Advice on how long to continue this tedious routine varies from 10 to 30 rounds. The procedure supposedly smooths the bore, making it much more accurate and less prone to jacket fouling. Some even claim that a barrel that isn't broken-in "properly" will be ruined forever, unable to produce the half-inch groups necessary for the slaying of whitetail deer.

I've asked many shooters how they know this to be true. The usual answer is that everybody knows a barrel must be broken-in, because so many people know how. Thus the answer becomes circular: If it isn't necessary to break-in a barrel, why are there instructions on doing it? This resembles a dog chasing his own tail.

Most rifle barrels do tend to become more accurate after some use. This was common knowledge even when I started obsessing over rifles in the 1960s, but back then we cleaned them only between range sessions. Often accuracy improved, usually about the time we got a handload worked up. Was this because the barrel was getting broken-in, or because we found the magic handload? Probably a little of both, because used bores usually did clean easier.

Sometime between the 1960s and the '90s, however, many shooters became convinced they had to break-in barrels before working up handloads. Today some even spend a Saturday at the range breaking-in their new alphabet magnum, never whanging out a three-shot group before the task is "properly" accomplished.

Oddly, the shooters most obsessive about break-in tend to shoot top-grade, hand-lapped custom barrels. These barrels are remarkably smooth already, unlike many factory barrels. So why do they need breaking-in?

Well, one part of a custom barrel isn't hand-lapped: the lands in the chamber throat. These often have small machining marks left by the reamer. David Tubb, the renowned high-power shooter, suggests that if a solid-pilot reamer is used (typical in factory barrels), each land in the throat also tends to have a slight "curl" of steel along one side. I've seen this through my bore scope—but I haven't seen this curl in any chamber cut with the floating-pilot reamers normally used by custom "accuracy" gunsmiths.

Tubb suggests the remedy is a few rounds of his Final Finish abrasive-coated bullets. This makes more sense than interminable cleaning. Shortly after acquiring a bore scope, I used the same basic technique (with a "bore-lapping" kit) to smooth out the reamer-marked throat in a new Remington Model 700 in .223 Rem. Half a dozen shots did the trick, and the rifle turned out to be the most accurate factory rifle I've ever owned. When new it regularly grouped five shots of a top handload into 0.25" or so at 100 yds.

Would that rifle have been as accurate without smoothing the throat? Would barrels not "properly" broken-in be as accurate without a group-free Saturday at the range? It's impossible to know, because we can't break-in a barrel and not break it in at the same time. But other evidence suggests that no, breaking-in a barrel before shooting any groups wouldn't make any difference to long-term accuracy—or "cleanability." This evidence comes from thousands of accurate, easily cleaned barrels shot from the get-go.

In fact, many barrel-makers and custom riflesmiths state that "pre-group" break-in makes no difference, especially with lapped barrels. Yet some of the same barrel-makers and gunsmiths will outline a tedious break-in method. Why? Because their customers demand one, having heard about barrel break-in from their buddies and the Internet. This evidently counts more than the opinion of a mere barrelmaker or gunsmith.

Apparently nobody has ever taken 20 barrels from the same maker, then broken-in 10, and just started shooting groups with the other 10. A reasonable comparison would involve several test groups after 100 and 1,000 shots, and for reliable data these would have to be shot in an indoor range. This would be even more wearisome than a lost Saturday, which is likely the reason it hasn't been done.

In the end, the only logical reason for pre-group break-in is that benchrest shooters like a barrel to be shooting its theoretical best before a match. This makes sense if you're a benchrester, especially these days when almost all shoot the 6 mm PPC with the same loads. There's no point in "working up" a load, because that has been done by 10,000 shooters already.

But wasting a Saturday makes no sense for a busy elk hunter with a new .300 WSM. By the time he gets his rifle sighted-in and a new handload worked up, the barrel will be broken-in. If it isn't shooting accurately enough by then, something else is wrong.

Another common notion is that frequent cleaning is necessary for accuracy. Well, for more than 30 years every round from all my rifles has been logged into notebooks, along with cleaning intervals. After acquiring a bore scope about a decade ago, I also started noting how the barrel was cleaned and how long it took to clean to bare steel.

For decades it was suggested that a center-fire barrel should be cleaned every 20 rounds or so to maintain best accuracy. I've only owned two center-fires in the past 20 years that shot larger groups after 20 rounds. The rest could go anywhere from 50 to 500 rounds without showing any decrease in accuracy.

The rifle that can go 500 rounds without cleaning is the heavy-barreled Remington Model 700 in .223 Rem. that had its throat smoothed by fire-lapping. During its busy lifetime, this rifle has been shot more than any other I've owned. Twice it has gone 500 rounds without cleaning, and at the end of that string still shot the same size groups as it shot after 20 rounds. It also cleaned quite easily with three to four patches soaked in any decent chemical solvent.

The only reason I cleaned it after 500 rounds was to see what effect that would have on accuracy. As often happens, accuracy was slightly worse for the first group or two. After 10 rounds or so, groups shrunk to the same size the rifle shot after 500 rounds.

Of course, not all barrels act this way, but some do, and most can take far more shooting than shooters expect and still remain accurate. During a visit to the Sierra bullet factory I had an interesting talk with Kevin Thomas, the firm's test shooter. Kevin once performed a test of his own with a .308 Win. barrel. Generally he

*Machine marks left from the reamer in the throat of a rifle barrel's chamber can pick up fouling. That's where a little smoothing by fire-lapping can help a lot more than cleaning between shots for 30 rounds.*

**Photos by author**

cleans Sierra's test barrels every 50 rounds or so, but once he kept shooting a .308 barrel for 300 rounds without cleaning. It just kept shooting tiny groups, and since all this shooting was done in Sierra's indoor tunnel there was no doubt about the results.

"One interesting thing was the best groups were shot between 250 and 300 rounds after cleaning," Kevin said.

"So why did you clean the barrel after 300 rounds?" I asked.

Kevin shrugged. "General principles?"

Some Internet research indicated that most top benchresters still clean as often as they possibly can, to the point where the barrel crown gets worn out from brushing before the barrel gets shot out.

This only applies to "short-range" benchrest shooters. Apparently some long-range benchresters are leaving their bores alone for 80 rounds or even more. Why? Because in the really demanding 1,000-yd. game, they're finding they get more consistent muzzle velocities from a "dirty" barrel, and any slight variations show up in elevation changes way out there.

Once again, most evidence indicates that we inherited the 20-shot cleaning interval from short-range benchrest shooters. From what I can glean from their talk and writings, many (though not all) of these folks do things because somebody else does them, especially somebody who wins matches. As already noted, almost all short-range benchrest shooters use the same cartridge, and often the same bullets, powders, scopes, barrels and gunsmiths. The game isn't the same as it was 50 years ago when a new gunsmithing technique, scope or bullet could blow everybody else away. The differences in matches are probably mostly variances in shooting skill—especially in wind—rather than any difference in cleaning techniques. (Please note the word "probably.")

Apparently some shooters like to clean barrels. At the range the other day a guy was sighting-in a .270 WSM. He had a cleaning platform set up on his pickup's tailgate, and after every group he'd scrub the heck out of the bore. Then he'd go shoot another group. Many other shooters clean after every range session.

Now, there are reasons to clean that often. One would be blackpowder—real blackpowder, not the fake stuff most of us shoot—or corrosive primers. But with smokeless powder and modern primers there's no real reason to clean a barrel immediately after shooting, as so many shooters apparently do.

An exception might be if you live in a moist climate or store your firearms in a damp basement. Cleaning the bore would prevent atmospheric moisture from edging under the fouling and pitting the bore. A coat of oil would probably prevent this until the next shooting session, however.

*The condition of a rifle's bore is dependent on a number of factors, including the amount of high-volume use (top), such as prairie dog shooting, to which it has been subjected. A pre-treatment with a solution such as Ultra Bore Coat (middle) can result in drastic reductions, even elimination, of bore fouling. Finally, the author has found that some guns, like this 60-year-old Savage (bottom), shoot quite accurately, despite the likelihood that they were never cleaned properly.*

I live in a dry part of Montana, and even firearms kept in a basement safe don't rust. So I just "shoot them until they puke," as a friend puts it. They get cleaned when a target or my shooting notes tell me they're due. So far they've gone back to shooting exactly the same way they did before cleaning, some for thousands of rounds.

I obviously don't like to clean rifles. To me this has always been one of the selling points of smokeless powder. Apparently some other folks don't like to clean them either, if we can judge from the efforts to make cleaning unnecessary.

Coating the bullets with molybdenum disulphide ("moly") was supposed to do this, but the number of true moly believers has dropped considerably in recent years. This is partly because moly has its own problems. For one, the bore had to be coated with moly for the stuff to help. This isn't a problem in varmint or target rifles, but when some expensive big game ammunition came moly-coated, it often took 10 or so expensive rounds for the rifle to start shooting well. Then, if the owner compulsively cleaned it (see above), the whole process had to be started all over again.

Also, in some rifles moly itself built up enough to interfere with accuracy. Kevin Thomas ran an experiment and found that, in general, after about 50 rounds moly built up in the throat of most rifles, then got blown out by another bullet or two. During the last stages of the build-up, pressures and hence accuracy turned erratic. I saw this temporary erratic accuracy in a couple of my own rifles, the reason many moly-users run a cleaning brush through their barrels every 50 rounds or so, to knock the stuff back.

Then there is the drudgery of coating every darn bullet you shoot. This may be the biggest reason moly isn't the rage it used to be. Of course you can buy pre-molyed bullets, though not as easily as you could 10 years ago. And they are more expensive, and right now reloading is expensive enough without adding another few cents to every bullet.

It makes more sense to coat the barrel once instead of coating thousands of bullets, the reason I've been using Ultra Bore Coat (UBC) (www.ultracoatingsinc.com) for about three years now. This stuff supposedly prevents or vastly reduces metal fouling, whether lead or copper. In two .223s (other than the Remington 700 miracle rifle, which doesn't need it), UBC essentially cured the bore of metal-fouling totally. One of these was the chrome-lined barrel of a Bushmaster AR-15, so it works on chrome, too. Or at least it does if installed correctly.

Like most cleaning solutions, UBC goes into the bore on a cotton patch. The bore, however, must be as clean as Aunt Josie's kitchen floor, and also degreased. The UBC is then allowed to dry for a while. The job is finished when the rifle is shot a few times quickly, the heat and pressure firming its ceramic components into the tiny imperfections in the bore.

*The author's Remington 700 "wonder rifle" in .223 Rem. has fired 500 rounds between cleanings without appreciable accuracy loss. He partly credits Ramshot TAC, a clean-burning powder, for the phenomenon.*

On a couple of rifles, however, it didn't completely "take." These were bores smaller than .224" and larger than .308". The problem here was either the small bore squeezing too much of the UBC out of the patch, or the larger bore not getting enough UBC. The small-bore problem is solved with a bore mop, and in a larger bore with big, sloppy patches—and if needed, a repeat application.

A repeat was required, for instance, in the bore of my .338 Win. Mag., a semi-custom FN Mauser with a take-off Sako barrel. This rifle always shot accurately, but the bore fouled like a hot Labrador in a cold mud puddle, and after 20 rounds accuracy went south. For years I put up with this, cleaning the bore every 20 shots with JB Compound and lots of effort. After a couple of applications of UBC it requires little cleaning.

The other thing about UBC is that if a barrel does need cleaning, it shouldn't be done with a brass brush or, heaven help us, an abrasive. This will, in computer language, "uninstall" it. Today, however, we're blessed with vastly improved cleaning solutions that don't require brushing or abrading.

I've tested most of these since buying my borescope, and all work. The trick is to find cleaners that work with your temperament. I am not a particularly patient person, and hence hate shoving the same stuff in and out of a rifled bore repeatedly.

These days, unless I'm prepping the bore for UBC, JB Compound doesn't get used anymore, because if a barrel fouls badly enough for JB then it needs fixing. If the bore needs cleaning right now, I use Montana Extreme's .50 BMG, an aggressive copper solvent that is much gentler on bores than older super-solvents. If there's more time, Wipe-Out gets squirted in the muzzle and the bore soaks overnight. The latest version of Wipe-Out will absolutely clean most bores with one application, and the bore doesn't need oiling afterward to prevent corrosion, as it does after using most solvents.

Oh, I almost forgot. Before using .50 BMG or Wipe-Out, I push a few patches soaked in Hoppe's No. 9 down the bore, to get any powder fouling out before using the copper solvent. This isn't needed with Wipe-Out, but the scent of Hoppe's is the one pleasant aspect of barrel cleaning, and I do believe that Aroma No. 9 makes rifles relax and shoot more accurately. There is no hard evidence for this, but then there isn't much for a lot of stuff about barrel cleaning, either.