

## John Barsness

Many handloaders firmly believe in certain “facts” about bullets, that might have been valid way back when, only apply in certain circumstances or were based on faulty assumptions. They’ve been passed down ever since, like the family legend that our great-grandfather Liam was a native Irishman, even though his birth certificate says Schenectady.

Perhaps the most common is that seating bullets deeper increases pressures. This is correct – some of the time. Seating handgun bullets deeper does normally increase pressures, primarily because most pistol powders are degressive, burning fastest upon ignition and reaching peak pressure almost immediately. Deeper seating leaves less room inside the relatively small case for instantaneous powder-gas expansion, and in revolvers the bullet has to travel farther before pressure is relieved by the cylinder/barrel gap.

Progressive rifle powders burn slowest on ignition, then faster as the granules are consumed. Pressure increases relatively slowly until the bullet hits the rifling, then rises more rapidly due to increased resistance. Even then pressure normally peaks only after the bullet has traveled an inch or more down the bore.

# Bullet

# Myths and Maybes

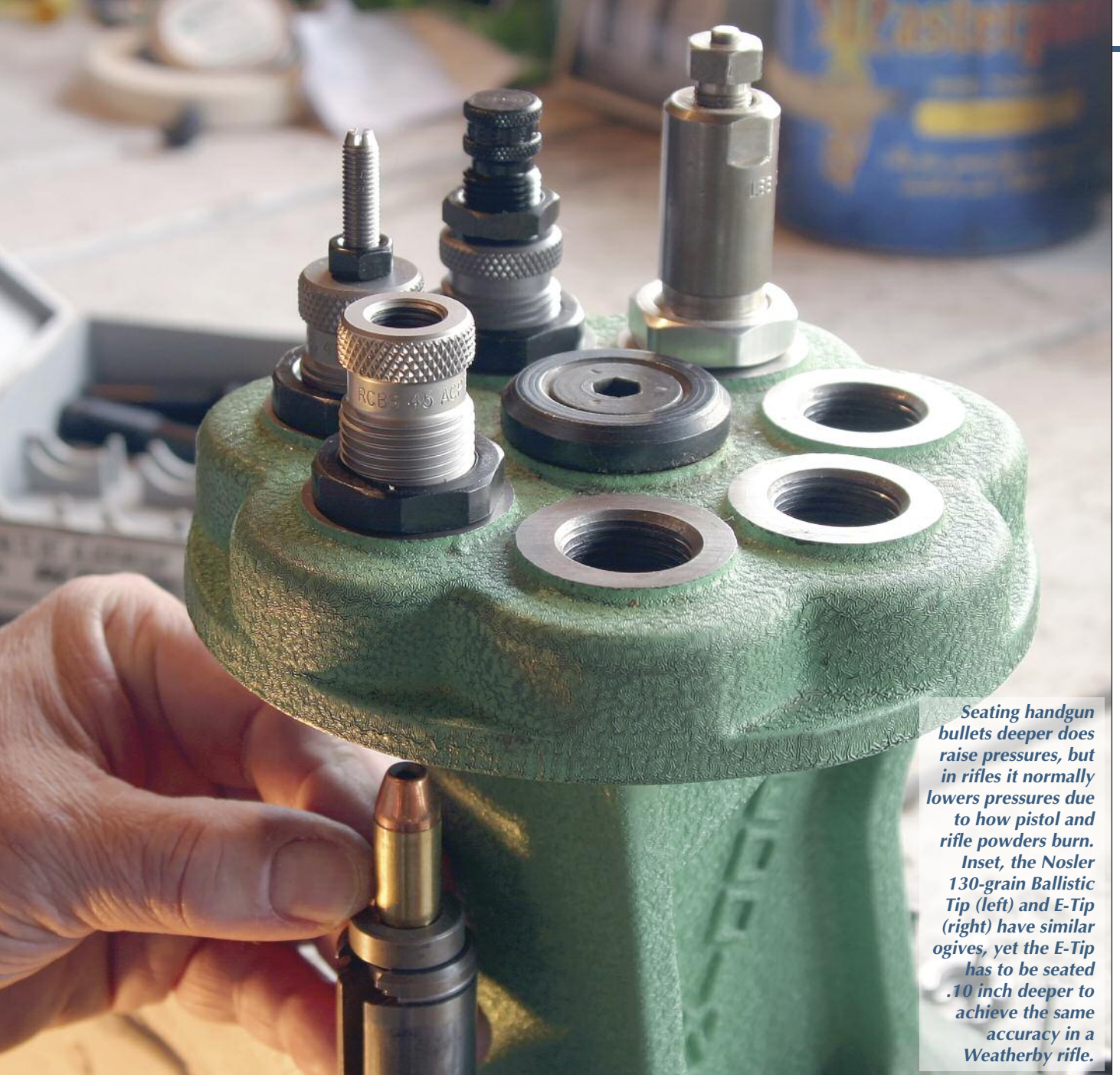
As a result, when rifle bullets are seated farther from the lands, pressure tends to decrease, at least until bullets are seated *very* deeply, say .5 inch deeper than normal. Around that point the smaller amount of space inside the case can increase pressures, but seating a bullet that deeply in most bottlenecked rifle cases can be quite a trick. Often the ogive is too far inside the neck to hold the bullet firmly.

This ties into another semi-myth, that rifle bullets must be

## Debunking a Few Handloading Myths



seated very closely to the beginning of the rifling for any sort of accuracy. There’s an element of truth here, because many rifles do group tighter with bullets seated near or even touching the lands. In fact, most benchrest shooters find bullets “jammed” into the lands shoot most accurately. This was pretty much confirmed during the “Houston warehouse”



*Seating handgun bullets deeper does raise pressures, but in rifles it normally lowers pressures due to how pistol and rifle powders burn. Inset, the Nosler 130-grain Ballistic Tip (left) and E-Tip (right) have similar ogives, yet the E-Tip has to be seated .10 inch deeper to achieve the same accuracy in a Weatherby rifle.*

shooting experiments performed by some benchrest shooters during the late 1970s and early 1980s, where the empty center lane of a big warehouse provided a not-totally-legal place to fool with accurate rifles and handloads in wind-free air. (An interesting article on the warehouse experiments appeared during the 1990s in a special edition of now-defunct *Precision Shooting* magazine.) Some benchrest shooters even have definite ideas of how much of a mark the rifling should leave on the bullets, such as a “square” versus a “long” impression. My own benchrest rifle, a 6mm PPC built by local Montana gunsmith Arnold Erhardt, definitely prefers its bullets jammed into the rifling.

Jamming isn't a good idea in hunting rifles, however, or even many target rifles, because the bullet can wedge firmly in the lands, remaining in place even

when a round's ejected. This not only prevents another cartridge from chambering but also spills powder throughout the action.

Plus, in some circumstances, rifles shoot quite accurately with bullets seated off the lands, sometimes a considerable distance. The chambers for most Weatherby magnum cartridges have longer throats than most comparable centerfire rounds. Called “freebore” by Roy Weatherby, this safely allows more powder to be used to obtain more velocity. However, many accuracy loonies, including some gunsmiths, firmly believe the long throats prevent Weatherby cartridges from shooting as accurately as possible. (Here it should probably be mentioned that the technically correct term for the rifling-free portion of the bore in front of the chamber is “leade,” not throat. But most shooters



Left, the chambers for most Weatherby magnum cartridges have longer than normal throats, so bullets usually can't be seated anywhere close to the lands. Weatherby rifles still usually shoot accurately with factory ammunition. Above, the chamber throat in John's CZ 9.3x62 Mauser is so long, bullets seated to fit in the magazine are a long way from the lands, yet it shoots accurately.

look at anybody who uses the term leade like they have antennae on their baseball cap. Since English-language dictionaries are based on common usage, I'm going to use throat.)

In theory, bullets seated close to the lands can't tip slightly before

entering the rifling so travel down the bore perfectly straight. However, a long throat just slightly over bullet diameter also prevents bullets from tipping, especially longer bullets. This usually won't provide benchrest competition accuracy, but I've owned several Weatherby factory rifles that grouped at least as well (and often better) than custom rifles for the same Weatherby cartridges chambered with a shorter, conventional throat. (Incidentally, if a custom rifle for one of the freebored Weatherby rounds has a shorter throat, pressures rise considerably. Some of these rifles will blow primers with Weatherby factory ammunition, so the short throat should be noted in the barrel markings.)

Extra-long throats occur in other cartridges as well. In fact they were common in the early days of smokeless powder, because so many early smokeless rounds featured long, roundnosed bullets. The 9.3x62 Mauser is a good example. It

**Barnes advises seating TSX bullets .050 inch off the lands, yet they often shoot as accurately as lead-core bullets seated much closer.**

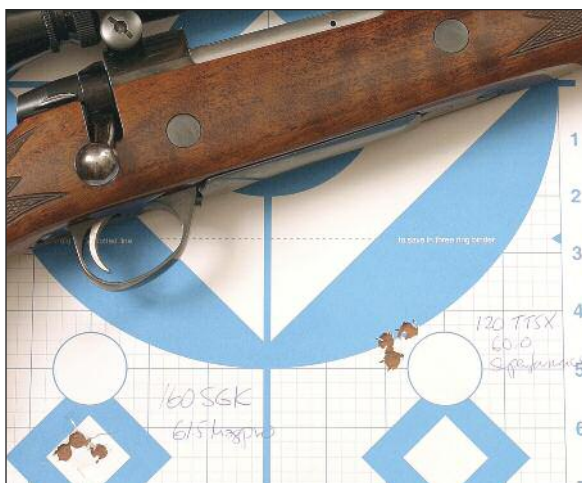
was designed to provide maximum bullet weight and diameter in a cartridge able to function in an unaltered 98 Mauser action. The standard 286-grain bullet is as long as a 200-grain, .30-caliber bullet, so the chamber required a long throat.

The 9.3x62 has become fairly popular in the U.S. over the past decade or so and has become known as one of those cartridges that shoots very accurately with a wide variety of ammunition. Yet the standard 9.3x62 throat is so long, it's often impossible to seat bullets out far enough to touch the rifling and have cartridges fit in the magazine. This is exactly the case with my own CZ 550 9.3x62, yet the rifle still groups three shots at 100 yards into .75 inch or less with most ammunition, factory or handloads.

Another frequent exception to the "seat 'em close" rule is monolithic bullets, such as the Barnes TSX, Hornady GMX and Nosler E-Tip. Often these shoot more accurately after a good run at the rifling. Barnes recommends seating its TSX .050 inch away from the rifling, and even deeper if accuracy isn't so hot. The same basic technique often applies to E-Tips and GMXs.

For several years I owned a Weatherby Mark V Deluxe .270

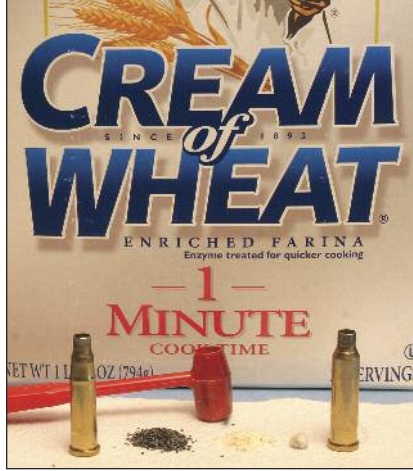
# Bullet Myths and Maybes



Weatherby Magnum and wanted to shoot the then-new 130-grain E-Tip. Instead of starting out with the expensive E-Tips, however, I first tried relatively inexpensive 130-grain Ballistic Tips (which have a similar ogive) seated just deep enough for rounds to fit in the magazine. A powder charge of 80.0 grains of Ramshot Magnum proved most accurate, with three-shot groups averaging a little over .5 inch.

With the 130 E-Tips I started with 78.0 grains of powder and the bullets seated the same as the Ballistic Tips, and worked up to the 80-grain powder charge. Velocity was similar but accuracy wasn't, averaging around 1.5 inch. So I started seating the E-Tips deeper, and with the cartridge overall length .1 inch shorter than with Ballistic Tips, groups shrank to about the same size.

Even some relatively soft bullets will shoot more accurately when seated well off the lands. Berger suggests starting Hunting VLDs at



*Some shooters claim fireforming brass with fast-burning powders topped with uncooked cereal will erode the throat, but using the Cream of Wheat method to blow out 200 .22 Hornet cases in a CZ .17 Hornet didn't result in any visible erosion or loss of accuracy.*

four distances off the lands, starting with .010 inch and ranging up to .130 inch, shooting a couple of groups at each seating depth to see which the rifle prefers.

Usually, but not always, the reduction in pressure with deeper-seated bullets can be seen on a chronograph through slower ve-

locities. In the .270 Weatherby Magnum, velocity fell 70 fps between the original seating depth and bullets seated .1 inch deeper, though often the difference in velocity is considerably less. Many "home chronographs" have such a short screen spacing, however, they only show an approximation of actual velocity for each shot. The average velocity for a long string of shots will probably be very close to the average velocity measured by an Oehler 35P, but a three-shot string from a short chronograph might not be enough to accurately indicate the slightly slower velocities.

Another common bit of wisdom is a throat with the lands longer on one side than the other won't shoot accurately. Lopsided throats show up in factory rifles far more frequently than most shooters realize because of the necessary tolerances between bore diameters and the solid pilots on the chamber reamers used by many factories. This discrepancy can't be

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# Bullet Myths and Maybes

seen by the naked eye, and most shooters don't own borescopes.

The most recent example I found, using a Hawkeye borescope, was on a factory Remington 700 .204 Ruger barrel. The fine accuracy of the original barrel on the Remington 700 VTR .204 had started to disappear after a few years of prairie dog shooting. Over the decades I've found Remington factory barrels normally shoot pretty well, so rather than spend several hundred bucks for a rebarrel job, an unfired, stainless barrel was purchased from an Idaho gunsmith for \$75. It had been removed from a brand-new 700 while building a custom rifle for a client.

I used a Brownells barrel vise to remove the old barrel and screw in the bargain barrel. I've replaced several 700 barrels this way over the years, and the majority of the time the headspace of the replacement barrel has ended up within

Bullet Seating Depth Results							
bullet (grains)	powder	charge (grains)	primer	case	overall loaded length (inches)	velocity (fps)	100-yard group (inches)
<b>.223 Remington, Remington 700 BDL Sporter, 24-inch barrel:</b>							
50 Nosler Ballistic Tip	H-335	26.0	CCI BR4	Remington	2.300	3,424	.50
		26.0			2.280	3,408	.56
		26.0			2.260	3,404	.74
		26.0			2.240	3,348	1.19
<b>6mm PPC, Erhardt benchrest rifle, 25.5-inch barrel:</b>							
65 Berger flatbase	Benchmark	30.0	F205M	Norma	2.130	3,514	.197
		30.0			2.125	3,498	.413
<b>.270 Weatherby Magnum, Mark V Sporter, 26-inch barrel:</b>							
130 Nosler E-Tip	Magnum	80.0	F215M	Weatherby	3.250	3,427	1.58
		80.0			3.200	3,397	1.26
		80.0			3.150	3,359	.57

*Be Alert – Publisher cannot accept responsibility for errors in published load data.*

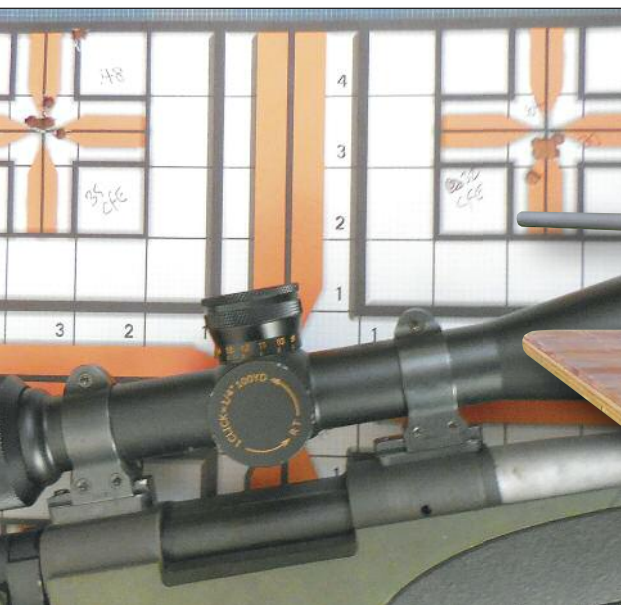
SAAMI specifications. Headspace turned out fine with the new .204 Ruger barrel, but I was disappointed to look through the borescope and find the lands at least .1 inch longer on one side of the throat.

According to rifle lore, this barrel shouldn't shoot, despite the very smooth bore, but I'm always ready for some rifle-loony experimentation so took the rifle to the range with handloads worked up in the old barrel. After sighting-in at 100 yards, a couple of 10-shot groups averaged right around .8 inch! This is about as well as the original barrel shot when new, and my favorite prairie dog rifle was good to go again.

However, it occurred to me the barrel might not shoot very well with other loads. I'd been meaning to try some new powders in the .204 anyway so loaded various bullets from 26 to 40 grains with half a dozen powders. During the second range session, five-shot groups were fired, and the two largest measured slightly over an inch, which still isn't bad for loads picked purely for their listed muzzle velocities.

Aside from that pair, the *average* five-shot group from all the other loads measured .65 inch. The most accurate combination turned out to be the Berger 35-grain hollow-point and 30.5 grains of Hodgdon

*The lands of the replacement barrel on a Remington 700 .204 Ruger are much longer on one side of the throat than the other, but the rifle still shoots accurately enough for prairie dogs at 400+ yards.*



CFE 223, grouping slightly under .5 inch at over 3,800 fps. That sort of accuracy won't win benchrest matches, but in my experience, it is more than enough for prairie dogs and pretty darn good for a sporter-weight factory barrel.

Before all this test-firing, my original thought was to have the barrel set back and rechambered with a new throat, but now I'm just going to shoot it like I stole it – and \$75 for a new barrel almost qualifies as theft. Will other barrels with uneven lands shoot as well? Maybe not, but from now on I'm not going to make any assumptions.

Another claim heard here and there is the "bullet-free" method of fireforming cases with small charges of fast-burning pistol powder fries chamber throats, because pistol powders burn really hot. This sounds logical, but military research indicates the *duration* of the powder flame at high pressure is probably the major factor in barrel erosion.

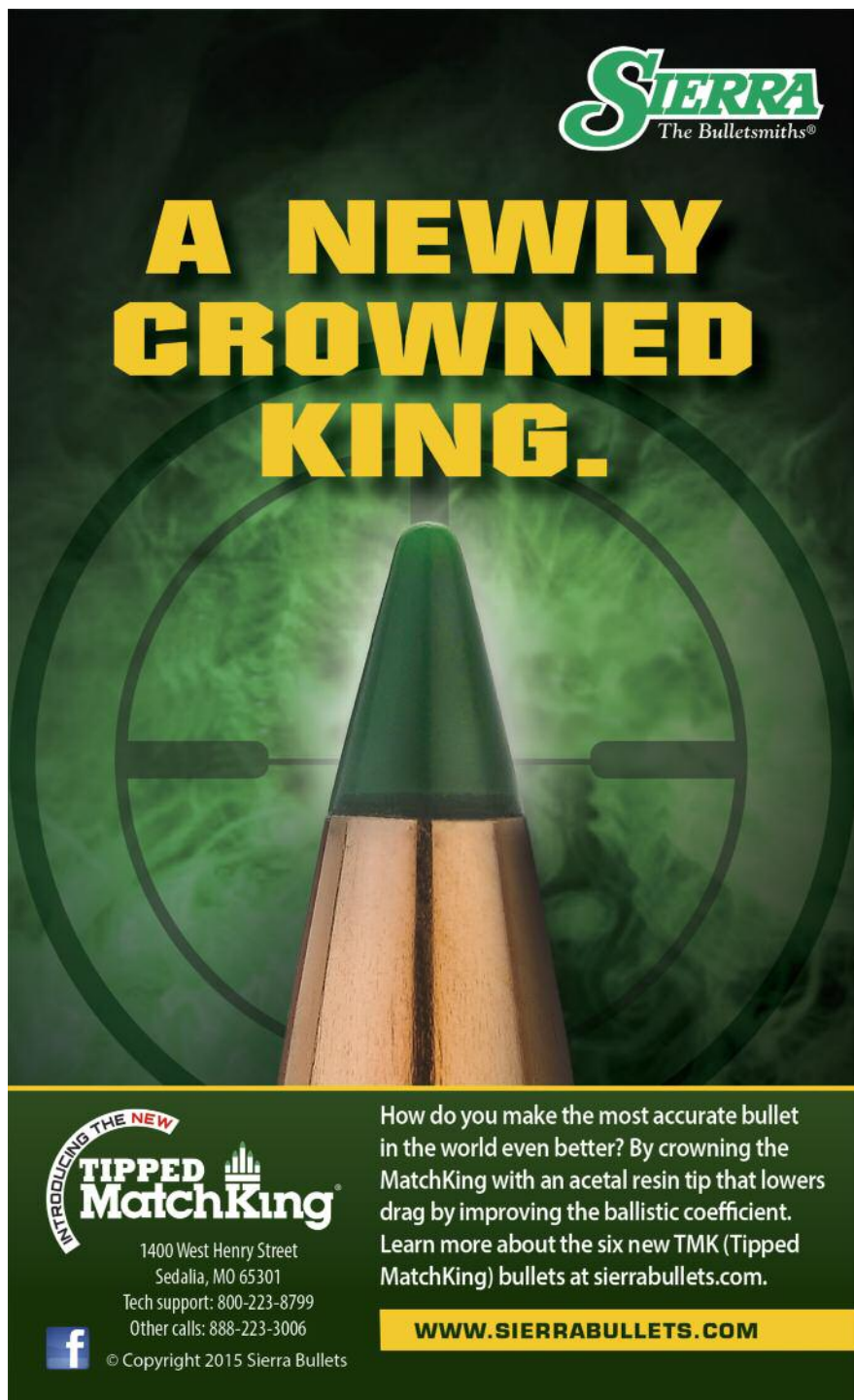
In the winter of 2013, I purchased a CZ 527 .17 Hornady Hornet. I normally try to have at least a few hundred rounds loaded for any of my varmint rifles before the spring rodent-shooting season, but due to Obama Panic II, Hornady was busy making boring, old .223 Remington brass, so it hadn't made any .17 Hornet cases in a while. Luckily, over 1,000 new Winchester .22 Hornet cases rested on a shelf in my loading room, so 200 were converted to .17 Hornet.

This isn't as easy as it might sound, since seating bullets in the necked-down .22 Hornet brass sometimes collapsed their gently sloping shoulders. Instead of fireforming the cases while shooting ground squirrels, they were formed with 3.5 grains of Bullseye under enough uncooked Cream of Wheat to fill the case. I checked the throat of the rifle with a borescope before, during and after the firing and couldn't find any trace of throat erosion. While the barrel got a little warm, it certainly didn't get as hot as it would on a prairie dog town.

A few months later, I was e-mailing back and forth with the late Mickey Coleman, a fine accuracy gunsmith from Alabama, and we got onto the subject of fireforming cases. It turned out Mickey also used Bullseye to fireform new 6mm PPC brass to the chambers of his benchrest rifles. Many benchresters perform this job by shooting bullets, but Mickey thought the pistol-powder method extended the life of his best-shooting barrels

because, like me, he hadn't found any visible evidence of erosion in his borescope. His barrels also seemed to last just about as many rounds when fired with bullets.

Based on this limited evidence, my guess is that small amounts of pistol powder erode barrels far less than several times as much rifle powder behind bullets at 60,000 psi. If anybody has evidence to the contrary, I'd appreciate hearing from them. ●



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