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A pair of “new” .45 ACPs: a stainless Ruger SR 1911 and a Remington R1 Enhanced model. Pistol photos by Charles E. Petty. Background photo by Terry Wieland.

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Much of the rifle-shooting public is enamored of bullet velocity. Caliber or weight make no difference – just increase muzzle speed. Then increase it some more. Rise of this idea came in the formative years of smokeless powder cartridges. Rifle folk experienced how increased velocity gave flatter trajectory. Hitting a target became easier. The number of shooters walking around sporting scarred facial features, less than the normal number of fingers or a patch over one eye caused by burst barrels and failed actions that had been designed for black powder didn’t slow the trend one bit.

Earliest smokeless rounds designed solely for varmints (eastern woodchucks) were wildcats, all intent on higher velocity. In America the premier varmint round became the black-powder .22 WCF filled with smokeless and called the .22 Hornet. All, however, were wind sensitive.

The next widest bullet above .22 was then .25 caliber. Lightweight slugs of this size were not very accurate at long range, yet heavier numbers increased recoil and noise considerably. An in-between caliber was obvious, but it was not going to happen because varmint hunters were handloaders. Factory ammunition sales of a new cartridge would be small, and it is no secret that ammunition is where the money is in the gun business.

Then, during development of the 7.62 NATO, which became the .308 Winchester, Olin necked the new case down to many different calibers. Among these was the 6mm. In 1955 the result was introduced as the .243 Winchester.

The .243 Winchester became a howling success, but not because of its varmint application. Winchester marketed it as a combination deer/varmint round – heavy accent on the deer part. It was light-recoiling deer rifles that sold guns and factory ammunition. If there is any doubt, look at the competition, the .244 Remington. It came with a slower rifling twist that gave better accuracy to varmint-weight bullets but would not perfectly stabilize heavier slugs. More varminters probably owned and shot .244s than .243s in the early years; nevertheless, the cartridge failed to sell because of the heavy bullet thing. Deer hunters buy factory rifles and factory ammunition; varmint hunters re-barrel rifles and handload ammunition.

Roy Weatherby wisely waited a few years to see how the new rounds fared with shooters. Thus it wasn’t until 1968 that the new .240 Weatherby Magnum became reality. Despite the .240 number, the rifle had standard 6mm (.236 inch) bore and .243-inch groove diameters.

What was not standard was the case. Being a Weatherby Magnum, belted brass was a given. However, one of slightly smaller than H&H diameter was a surprise. Belt and rim are .470 inch across rather than the .532 inch of H&H belted cases. Handloaders familiar with cartridge dimensions will recognize this as the base diameter of the .30-06. Case length is nominally 2.5 inches and has the Weatherby trademark double-radius shoulder.

Now why would Weatherby incur the significant expense of producing a new case when simply necking down the .257 Weatherby Magnum is so obvious? Research seems to indicate that someone at Weatherby (probably Roy himself, and probably from “events” his customers had reported) was well aware of the then-mysterious blow-ups of rifles occurring when normal charges of very slow burning powders were cut back, leaving more airspace in the case. Light bullets and long throats also seemed to play a part.

Since the .257 Weatherby had more than enough powder capacity for .25-caliber bullets, necking it to 6mm would only make the situation worse. Then too, unlike the company’s other rounds, a 6mm
would definitely be used on varminst with light-bullet handloads. The .257 necked down left a lot of airspace with such loads. Another hint was that the .240 Weatherby lacked the long freebore section in its throat, a feature common to all other rifles Weatherby sold that chambered Weatherby cartridges.

So the .240 Weatherby uses a long, thin, belted case having the capacity of the .30-06. Wildcatters will see it as just the 6mm-06, created long ago to fire 6mm Lee Navy bullets. The number .240 probably came from an old (1920’s) Holland & Holland cartridge called “Hollands 240 Magnum Rimless” or sometimes “240 H&H Apex.” It also used a small diameter belted case but not quite the same as the Weatherby.

Another odd fact is that virtually every writer who covered the introduction of the .240 Weatherby indicated he had previous knowledge of the round and/or had something to do with its development. It is true that George Nonte, author of *Home Guide to Cartridge Conversions*, formed the first .240s from .30-06 cases so Weatherby could test the round.

Factory ammunition began with a 70-grain pointed softpoint giving a muzzle velocity of 3,850 fps. Then came a 90-grain softpoint at 3,500 fps and a similar 100-grainer showing 3,395 fps. Powder was stated to be Norma 205; barrel length, 26 inches. In comparison, .243 Winchester 100-grain bullets were listed at 3,070 fps and .244 Remington 100-grainers at 3,190 fps. This meant Weatherby’s bullet...
was still traveling at about the same velocity at 100 yards as the others were at the muzzle. Energy figures saw the Weatherby exceeding the others by 13 to nearly 20 percent at all ranges.

The .243 and .244 were only loaded with 80-grain bullets, but the .240 exceeded those speeds with its heavier 90-grain number. Weatherby’s 70-grain softpoint had no competition early on, giving a midrange trajectory of only 3.9 inches at 300 yards. The only comparable round was the .220 Swift’s 48-grain bullet at 4,110 fps.

Weatherby factory ammunition is loaded by Norma. Thus European standards for maximum pressure apply. Both copper crusher and transducer methods are used. When results are converted to U.S. measurements, the .240 Weatherby registers 55,000 CUP (crusher) and 63,400 psi (transducer). This is essentially the same as modern magnums like the .300 Winchester. Handloaders need be aware, however, that maximum powder charges will vary depending upon bullet construction. Use only maximum powder loads that have been tested with the exact bullet in question.

Thus the .240 Weatherby accomplished exactly what Weatherby cartridges are famous for – giving notably higher velocity and energy than standard factory rounds of equal caliber. Such performance, however, comes at a price: bullet performance. Many hunters tend to buy rifle/cartridge combinations that will kill the intended game at 350 yards, then actually shoot the critter at 100. Close up, bullets come apart unpredictably. If jackets are made tough enough to stand the short-range encounters, a bullet may not open at all at longer distances. Weatherby became an early user of custom bullets designed to solve this problem.

In 1979 Weatherby added two new bullets to the .240’s list: a Nosler 85-grain Partition at 3,500 fps and a similar 100-grainer at 3,395 fps. Being a bit less streamlined than the other softpoints, speeds dropped off slightly faster but not enough for a 100-yard deer to notice. The rear of the bullet behind the partition held together and kept on penetrating. A lot of dead closeup things resulted. Of course, the front of the Nosler would still expand on long-range shots.

The 85-grain Nosler was dropped in 1981; the 75-grain softpoint in 1985. So much for the varmint shooting aspect, at least from factory ammunition users. Today the line is larger than ever, including a Barnes 85-grain TSX, Hornady 87-grain Spire Point, Nosler 95-grain Ballistic Tip, Hornady 100-grain Spire Point and Nosler 100-grain Partition. Brass is also available.

Many have opined that the .240 Weatherby is dead, but factory ammunition availability/sales don’t show it. The Mark V is still available in Ultra Lightweight form so-chambered, and the Vanguard line will add it in early 2012. I’d say such pronouncements are more than a little premature.
The Joys (and Sorrows) of Brass

Getting Down to Cases

This .50-90 brass made by Starline is almost finished, awaiting the punching of the flash holes.
Pants are unimportant if you own some, Robert Ruark once famously observed, but very, very important if you do not.

Ruark was not a handloader, but his insight applies equally to that commonplace commodity we rather cavalierly dismiss as brass. Happy is the man with an ample and high-quality supply of cartridge cases for his rifle or pistol, but woe betide the man who does not.

In recent years, the making of brass cases has become much more democratic than in the past, as more and more small companies have entered the field, supplying cartridge cases for obsolete calibers, rare guns, wildcats or proprietary cartridges. Some of this brass is first-rate; others—well, not so good. And some—almost worthless.

Fifty years ago, brass was sold mostly by large companies that also produced loaded ammunition, such as Winchester, Remington or Sweden’s Norma. Such brass, manufactured in large lots to strict quality requirements, set a very high standard. Winchester brass has always been regarded as the best available in the United States, and Norma brass is equally good. This is not to denigrate Federal, Hornady, Remington or RWS, but over the years Winchester and Norma simply became bywords for good brass.

Having such large companies as your sole source of brass, however, is a two-edged sword. Certainly they produce quality brass in large quantities, but if demand drops off, they may stop making it altogether, because they cannot justify turning out the large batches (at least 250,000 cases at a crack), which their production managers insist upon.

A large company typically has a limited number of machines that are used to produce all its cases. When the time comes, the machines are tooled up for a particular caliber, and the company does a production run. These cases go into inventory, which is drawn from for years hence. The machines are then retooled for a different caliber. Some cartridges, such as .38 Special, .45 Auto and .308 Winchester, are in such demand that they are produced continuously—or become the default for the machines when they are not needed for something else.

More arcane calibers, though, such as .225 Winchester or 8mm Remington, may be produced in large lots, but it will be sporadic. Hence, a caliber may be sold out and remain out of stock for some months, until another production run is scheduled. If, in the meantime, the company lands a large government contract calling for millions of rounds, production of other cartridges may be delayed for months, years or indefinitely. The structure of this process not only explains why some calibers periodically go into short supply, but it also explains why brass in different calibers from the same company may vary in quality.

With brass cases, consistency of quality, in terms of hardness especially, is very important. If there is a glitch of some kind in the production of a particular run, then every case in that run may exhibit a problem; yet, another caliber produced by the same company at the same time may be perfectly good. Usually, this is the result of an annealing problem—ensuring the brass is the right hardness throughout the production process, and that the brass that goes out the door is the right degree of hardness from the neck down.

Starline Brass in Sedalia, Missouri, is a small specialty maker of brass, producing a relatively short list of available calibers but of exceedingly high quality. Starline tends to produce brass other companies avoid because the demand is small, such as .40-65 or .50-90. Starline recently invested in a new furnace with a wide conveyor belt that allows brass to be spread out evenly for heat-treating between draws.

“We used to heat them in large containers, but it was difficult to get consistency,” I was told by Hunter Pilant, Starline’s media-relations officer. “When you heat brass that way, the cases on the outside heat more quickly than those in the center. With this new machine and furnace, quality is very uniform and easy to maintain.”

This consistency of quality and ease of operation, however, come at a price. Such a facility is a big investment that is generally beyond the capability of small outfits that produce brass a few thousand cases at a time.

Different shooters have different requirements in their brass cases, but some are common to all. A hunter with a century-old rifle simply wants cases that fit his chamber and is grateful for that. Even if he gets only two or three reloads, that’s better than nothing. A benchrest competitor, on the other hand, wants cases not only perfectly dimensioned to a few thousandths of an inch, but he also wants the closest possible uniformity of weight and case capacity.

A common demand, however, is that a case be reusable as many times as possible—and even, in some instances, indefinitely. Some benchrest shooters use just one cartridge case in a match, reloading it at their shooting bench between shots. Such a case will undergo absolute minimum resizing—considerably less than a hunting or general target round—so hardening and cracking of the brass from reworking will be modest. Still, the brass will be stressed with every shot.
Getting Down to Cases

A hunter loading big cartridges for a dangerous-game rifle should full-length resize every time and apply a solid crimp as well. This works the brass, hardening it progressively. That is a small price to pay, however, for the absolute dependability that is paramount with a rifle for animals that bite, kick, stomp and gore. Here is where we get into metallurgy and the factors that make brass good or bad.

Brass is an alloy of copper and zinc (bronze is copper and tin) and one of the oldest alloys known to man. As such, there are not many mysteries about it. Like lead, annealed copper is a “dead” metal; change its shape, and it stays changed. A “live” metal, like steel (an alloy of iron and various other ingredients) bounces back. It is ductile.

Brass is also a live metal, and it is this ability to expand and provide a pressure seal, but bounce back to its original shape, that makes brass ideal for cartridge cases. There is, however, a drawback: Brass is susceptible to becoming work-hardened. Every time the metal expands or is resized, it becomes a little bit harder, eventually becoming brittle and prone to splitting. The more the metal is worked (through full-length resizing, for example) the quicker it becomes brittle.

The answer to this problem is heat treatment. Heating the brass and then allowing it to cool anneals the metal, returning it to its soft state (see sidebar).

There is another factor to be considered, which is that we don’t want a brass case to be the same hardness from one end to the other.

It is important that the base of the case be hard enough to withstand pressure without expanding unduly. We don’t really want the web and the head of the case to change shape when the rifle is fired, only the case walls forward of the web that expand to temporarily grip the chamber walls and provide a seal. So, in annealing cases, while...

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The production floor at Starline. Making top-quality brass requires a substantial investment in both equipment and staff.

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**Care of Brass**

1. Clean brass using either commercial cleaners marketed by shooting companies and warranted safe for brass cases or non-chemical materials, such as ground corncob.

2. Do not use any cleaner containing ammonia.

3. When using either older primers or propellants, clean cases as soon as possible after every firing.

4. When reloading such cases, examine each one closely every time, looking for signs of deterioration. These include corrosion, discoloration and tiny cracks.

5. With old brass, keep pressures low to minimize stress. If new brass is available for older rifles, use it wherever possible and relegate old brass and ammunition to collectors.
we want the mouth, neck and probably the shoulder of the case returned to a soft state, we most emphatically do not want the head and web softened.

In manufacturing brass, a company like Starline pays close attention to the condition of the brass throughout each operation.

Winchester, Remington and Norma brass, manufactured in large lots to strict quality requirements, set a very high standard.

A case begins with a flat disk of brass resembling an unstruck coin. Through a succession of sharp blows in several dies, the disk is drawn out into a cup – at first wide and shallow, then progressively narrower and longer. Each of these drawings work-hardens the cup to some extent. Periodically, the cups are run through the furnace on a conveyor belt, being heated to the optimum level for annealing, then returned to the forming process for further drawings.

When the case has been finally shaped, given its headstamp, groove, primer pocket and flash hole, and the neck sized, it receives a final specific heat treatment that leaves the base and web hard but the neck and walls relatively soft. Such treatment discolors the brass (it resembles a purplish bruise), which is usually polished off and the brass given a bright shine before it is packed. Sometimes you find brass with the heat marks left on. It is not a problem.

In the 1960s brass for many cartridges became difficult to find. In Britain, Kynoch discontinued most of its large African cartridges. In the U.S., older rounds like the .40-65 fell off the lists. If cases could not be manufactured from some existing round, a final option (and one that is spoken of blithely as if it is no problem at all) is to turn a case on a lathe from bar stock.

This sounds good when you say it quickly, but if you stop and think about it, a host of problems promptly rear their ugly heads. First is the structure of the metal itself. A case drawn from a disk, as described above, is not only work-hardened by the experience, but it’s also given some of the qualities forging affords to steel. By being hammered into shape, the metal’s
Getting Down to Cases

grain is made to flow uniformly, affording it greater longitudinal strength and ductility.

Cases turned on a lathe will not have this grain structure and, regardless of heat treating, will never be as ductile and durable as a drawn case. The second problem is getting the case walls thin enough; look at the mouth of a case like the .45-70 and imagine trying to turn it on a lathe and have absolute uniformity.

Usually, a chamber hole is drilled in the bar stock, considerably smaller than SAAMI specifications for the case, and the case is then turned to shape around it. Imagine making .222 Remington on a lathe; usually, you would drill a straight hole of about .224 inch diameter and machine the case around it. Although externally it might have the necked shape of the .222, it would have a chamber about the size of the .22 Hornet. It would mean working up entirely new loading data based on considerably smaller capacity.

With really large cartridges like the .600 Nitro Express, brass shotshells or large, low-pressure rounds like an eight- or four-bore (where, obviously, not many shots will be fired anyway), turning cases on a lathe might be practical. But it is not cheap, not easy and not very satisfactory. About the best one can say is, it’s better than nothing.

Even in extreme examples of case-forming, where you might begin with a large rimmed case and then hammer, bludgeon, squeeze and compress it down into a small, rimless, bottleneck case, the grain of the metal remains intact, the case’s structural integrity is preserved, and it will be capable of multiple loadings, even at substantial pressures.

As mentioned, there is good brass and bad brass. The difference is almost always the heat treating. Although not directly related to heat treating, head separations, such as occurred with these .300 Weatherby cases, is partly the result of excessive pressure, partly case stretching and work hardening the brass through resizing.

Some ammunition makers do not polish cases after final annealing. This has the advantage of indicating the cases have, in fact, been annealed.

The top case shows the dire effects of corrosion from black powder and corrosive primers.

These .303 Savage cases, head-stamped “OWS,” split on first firing, indicating the case walls are too hard and brittle – a failure of heat treating.
Annealing Brass

It sometimes becomes necessary to anneal brass, either because it is too hard and splitting or because it has become work-hardened from repeated firing and resizing.

Unlike tempering steel, annealing brass is relatively simple, but it does require care to avoid unduly softening the web and head of the case. The best way is to stand cases in a flat pan containing cold water, leaving about an inch of the case above the water. The cases should be deprimed to allow water into the case itself.

Using a propane torch, heat the mouth of each case to what is called “worm red.” This is a dull, rather than cherry, red. The redness may reach down to the shoulder. Then move on to the next one, leaving each case to cool naturally. It is not necessary to tip them into the water to cool them. The mouths of the cases will reach about 1,000 degrees; the water will gradually heat up, allowing the bases to reach about 200 degrees, but this does not hurt them.

Some articles have appeared suggesting the cases be stood in oil, and then tipped into the oil to cool them. This accomplishes nothing and makes it necessary to clean the oil off the cases afterward.

Do not place cases in an oven in an attempt to anneal them. This will soften the entire case. A result of poor annealing. The answer (assuming you cannot return the brass for a refund and look elsewhere) is to try to soften the new brass before firing. This may or may not work but, like turning brass on a lathe, may be the only option.

I was told the OWS brass was made by Bertram, yet a few years after my experience with the .303 treating (or lack thereof) and not a problem with the basic brass alloy itself. One of the most obvious symptoms of bad brass is case splitting on the first or second firing. Some years ago I bought (at great expense) some newly made .303 Savage brass. At the time, .303 Savage was like hen’s teeth. In Canada, a box of 20 rounds of original Imperial .303 Savage ammunition was selling for $80 to $100, and owners of Savage rifles were grateful to get it at the price. Alas, most of those worthies were not handloaders (how you could not be, in that situation, is beyond me) and threw the once-used brass away!

At any rate, I found some new OWS (Old Western Scrounger) .303 Savage brass, bought a box of it and loaded 10 rounds. Three split on first firing. The splits were up to an inch long, running longitudinally from just forward of the web to just behind the shoulder.

Such splitting is the result of brass that is too hard or brittle as a result of poor annealing. The answer (assuming you cannot return the brass for a refund and look elsewhere) is to try to soften the new brass before firing. This may or may not work but, like turning brass on a lathe, may be the only option.

I was told the OWS brass was made by Bertram, yet a few years after my experience with the .303...
Getting Down to Cases

A hunter loading big cartridges for dangerous game should full-length resize every time.

There are other reasons why brass cases become brittle and split. Some handloaders insist on having cases that are as brightly polished as a new penny and resort to using polishes like Brasso to achieve this. Any such polish that contains ammonia will react with the brass to make it brittle.

Some priming compounds react with the ingredients of various propellants, such as black powder, and cause either corrosion or hidden deterioration in the brass case. Similarly, anyone shooting old military ammunition should investigate the type of priming and, failing that, pay close attention for any sign of brass deterioration.

This topic could make an entire separate article. Suffice to say, modern primers with smokeless powders cause no such problems.

Savage, I bought some Bertram .40-70 Straight Sharps brass and have had nary a problem with it. Such inconsistency is a frequent complaint not only about Bertram but about other small brass manufacturers. Anything but! I will gladly deal with such difficulties if that’s what it takes to keep rifles shooting without recourse to making cartridge cases myself.

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