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RHINO BULLETS

The hammer of Thor

Today's conventional bullets are essentially the same as 100 years ago when velocities were fairly modest. Captain Rubin of the Swiss Army invented jacketed bullets in 1889. It might be appropriate to remind readers what these modest velocities were at the time when the British, Germans and Americans designed their first bolt-action rifles. At the time, the .303 Br was doing 2 050 fps and the 7.9mm Mauser 2 100 fps, while the .30-40 Krag could do 2 150 fps. During the Spanish War of 1898 and the second Anglo-Boer War of 1899, the 7x57mm Mauser was considered fast at 2 300 fps. Conventional lead-core bullets in these calibres worked very well on game, as their downrange striking velocities were well down at practical hunting ranges of 100-200 yards. Used sensibly, conventional bullets can still be effective hunting bullets. A .30-06 Spr with a muzzle velocity of 2 625 fps (PMP standard factory velocity), for example, will do about 2 050 fps at 250 yards.

The author with his SCI trophy blue wildebeest

Generally, these conventional bullets worked well for impact velocities between 1 900 and 2 100 fps in those small-bore cartridges. Copper jackets are typically as thin on bigger calibre bullets today as they are on smaller calibre bullets, despite very different energy values and resultant stress that is placed on the bullets at the time of impact. Conventional lead-core bullets with thin copper jackets do not have high threshold strength; in my opinion, they are essentially outdated with the faster and more powerful cartridges that are being used today.

Jacket/core separation

One of the biggest problems arising from increased velocity is bullet disintegration. The thin-jacketed bullet does not offer much protection to the non-bonded lead core. When the soft lead flows beyond the support of the jacket, it loses its integrity and will fragment or even disintegrate. Once this separation has occurred, the integrity of the bullet is lost. Fragmentation and/or shattering results in reduced bullet weight, which typically happens within the first two inches in an animal, and so momentum is lost to drive the bullet further. Furthermore, higher velocity causes the bullet to set up quicker, which reduces penetration. This is the reason why controlled expansion bullets (CEBs) were designed, as they create much better wound tracts.

Jacket/core separation – Sierra GameKing

The search for a stronger bullet construction

Bullet construction and design has undergone major changes and improvements since the very first lead-core bullet came into being. All major ammunition firms have introduced new designs, some more so than others. For example, Remington's first attempt was in 1939 when they introduced their classic Core-Lokt bullet. This bullet had a jacket that was thicker through the middle, attempting to lock the jacket to its core for improved weight retention. Today they offer a new bonded version called Core-Lokt Ultra with a tapered jacket to arrest expansion at some point, offering a better weight retention ratio. John Nosler gave us the "Partition" bullet in 1946, which was a step up. Hornady's SST is a very frangible bullet known for its violent expansion, which impairs penetration. The same can be said for Sierra's GameKing and Pro-Hunter – they are essentially still thin-jacketed bullets that are suscep-

tible to fragmentation, even though they have somewhat of a tapered jacket. In 1985, Jack Carter introduced the Trophy Bonded Bear Claw bullet, offering a 95% weight retention ratio; this was the very first bullet with a solid shank design. There are just too many to discuss, as these are merely mentioned as an example.

On the high end of bonded, premium-grade bullets, one finds bullets like Swift A-Frame, Swift Scirocco II, Trophy Bonded Bear Claw, North Fork, Woodleigh and Rhino. The purpose of this article is to look at the Rhino Bullet, which is manufactured in South African and came on the market in 1999.

Big-game bullets

When hunting tough big-game animals like buffalo, rhino or hippo, most professional hunters have migrated to controlled expansion bullets today, although they will always have solid, non-expanding bullets in reserve in case of a fleeing quarry. For leopard and lion, a bullet that opens up wide is preferred to create a large wound channel. Premium-grade bullets have changed the game; we no longer have to make do with old-style, conventional lead-core bullets with their unbounded and thin jackets that provide no mechanism to arrest the expansion some way down the shank. Even when hunting smaller game, many hunters have switched to a premium-grade bullet to minimise meat damage and gain better penetration.

Controlled expansion bullets (CEBs)

When a cartridge is picked for big-game ungulates, the penetration potential of the bullet needs to be balanced with the size of the hole (wound tract) that one wishes to create, and so it actually becomes a balancing act, even though you may do it intuitively. Penetration depth will firstly be impaired by the size of the bullet's frontal expansion and, secondly, by the force behind the bullet, which is described as the momentum value (i.e. mass x velocity). It therefore implies that one can manipulate both variables in picking both the cartridge and, by implication, the calibre and bullet weight that it will shoot and at what velocity, as well as the type of bullet with its unique expansion properties.

The interplay of all of this culminates in the set-up (expansion) rate of the bullet, its expansion of diameter when fully expanded, its weight retention ratio, and whether or not it has the ability to keep its petals intact, provided it does not hit large bone at an oblique angle. So the simple measure or yardstick boils down to force over area – or to put it differently, the basic input values of momentum divided by the bullet's cross-sectional area (Xsa) to give the penetration index (P). This is a simple method to compare the theoretical penetration potential across various cartridges and/or bullet/load combinations. It is important to know that an overexpanded bullet poses a serious risk of shallow penetration, and so the vitals of your quarry may not be reached with angled shots. This typically happens with thin-walled bonded bullets like the Norma Oryx and a few others. The opposite of this condition is when your bullet does not open up at all like a non-expanding solid, or at best just partially. When this happens, the size of the hole is smaller, but penetration will be greater, which illustrates the interplay of force over area at work.

In-target stability mechanism

As the bullet expands, it becomes shorter but also heavier towards the tip, with the heavier front always facing forward in the direction of motion. Effectively, the centre of mass (CG point) has been shifted forward in the process of expanding into a mushroom. To avoid veering off-course, the bullet should also expand in a concentric way. Bone deflection is another imponderable that we cannot control, especially at acute angles. As with solid bullets, the soft expanding bullet may also tip over right at the end of its journey when the velocity has fallen away, but that is of no consequence, as by then the bullet has done its work.

Velocity windows

When impact velocity falls too low (which depends on bullet construction), strongly constructed, controlled expansion bullets may not open up fully or not at all, therefore behaving just like a solid, non-expanding bullet. On the other end of the scale, at impact velocities that are too high, bullets may lose their petals or over-expand again, which goes against the design objective of seeking controlled expansion. Thus each bullet design must ideally be applied within its own operating velocity window for the best performance. Impact velocity is a much more critical factor with frangible bullets in terms of terminal performance. Some bonded bullets are too soft and are more velocity-sensitive, which may impair penetration so that the bullet may not reach the vital organs.

Rhino Solid Shank bullets

These bond-core bullets have a drilled hole in the front part and feature a solid copper shank at the rear, which is indestructible. The thick wall jackets attempt to keep petals intact and expansion gets arrested where the drilled hole stops. The net result is that it ensures a high weight-retention ratio. The copper jacket is made from solid bar stock and drilled to give thicker jacket walls as the calibre becomes bigger because it has to withstand higher-impact forces, for example:

Bullet	Wall thickness	Percentage
.458-500 gr	2.82 mm	259
.375-300 gr	2.26 mm	207%
.308-180 gr	1.91 mm	175%
.270-150 gr	1.52 mm	139%
.243-100 gr	1.09 mm	100%

The copper jackets are annealed to increase malleability, making the bullet stronger so that the petals do not shear off. The lead core that is bonded to the copper wall also strengthens the petals during expansion as it flows together in unison. The copper jacket tapers towards the front, although less so on big-bore calibres, so that bullets can expand more easily. All bullets come with a "protected

point" design to avoid deformed lead tips in the magazine under recoil. All bullets go through a finishing die at the end to ensure that they are within the CIP specification, which ensures consistency. The bullets are also moly-coated, which lowers the chamber pressure somewhat while reducing copper fouling in the barrel.

Bullets posted by Richard Sowry

Richard Sowry provided this fine display of Rhino bullets, illustrating how they performed. The recovered bullets in the photograph at the bottom of the page (from left to right) are:

1) .458 – Swift A-Frame 500 gr, ex wetpack
2) .458 – Rhino 485 gr, ex wetpack
3) .416 – Rhino 430 gr, ex wetpack
4) .416 – Rhino 430 gr, ex zebra
5) .416 – Rhino 430 gr, ex buffalo
6) .416 – Rhino 430 gr, ex buffalo
7) .416 – Rhino 430 gr, ex buffalo
8) .416 – Rhino 430 gr, ex buffalo
9) .416 – Rhino 430 gr, ex buffalo
10) .416 – Rhino 450 gr, ex buffalo
11) .416 – Rhino 430 gr, unfired
12) .416 – Rhino 450 gr, unfired

After the first test, the 450 gr .416 bullet appears to be perfect; velocity was about 2 200 fps. The velocity of the 430 gr bullets in .416 was 2 300 fps.

Meat hunters

The other advantage of a bond-core bullet for the meat hunter is that it does not contaminate the meat with millions of lead particles. Very little blood-shot meat is wasted with shoulder or body shots. Conventional soft-nose bullets with their thin and brittle jackets generally break up, shatter, lose most of their weight, or even disintegrate when hitting bone or sometimes even flesh if impact velocities are too high. Controlled expansion bullets are not only making our rifles more effective, but are also changing our views on terminal ballistics – it is no longer only the cartridge that counts.

Left: .458 Rhino Bullet construction – a big-game bullet Right: A 500 gr Rhino Bullet retrieved from a lion – sterling performance, considering that it travelled through the animal lengthwise.

Richard Sowry's bullets – side and top view