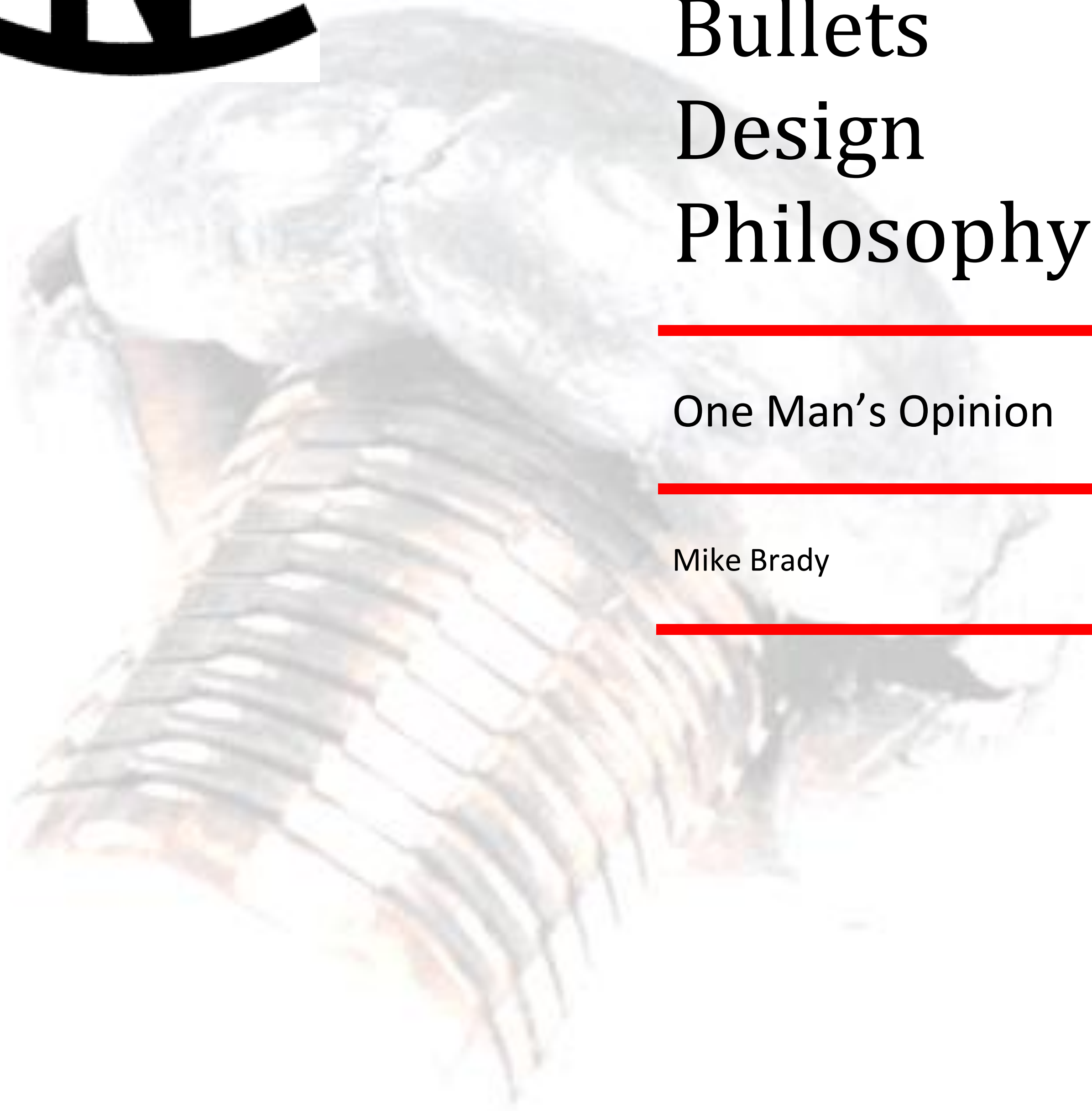

North Fork Bullets Design Philosophy

One Man's Opinion

Mike Brady

North Fork Bullets Design Philosophy

by Mike Brady

This article goes into the design philosophy behind North Fork products. A philosophy is just like an opinion and opinions are just like that other thing – everybody has one. So here is mine.

I am of the old school that appreciates the terminal performance reliability of a lead cored bullet. But I also like the indestructible nature of a solid sectioned bullet. When you marry the two concepts, the result is a bullet with a bonded lead core in the front and a solid rear section.

The design itself is surely nothing new. I have seen examples from as early as the 1930s, and I bet that someone somewhere had a similar notion and experimented with it even earlier.

As far as I know, the earliest commercially available bullet with a lead core in front and solid rear section was offered by P. O. Ackley in the late 1940s and early '50s. It was called the Ackley Controlled Expansion Bullet. Prior to bringing it to market, Ackley spent 10 years experimenting and refining his idea to come up with an internal design that would retain the structural integrity of the bullet on impact. Roughly ten years later, Jack Ashurst, better known for manufacturing reloading dies under the name of Jax Dies, made a bullet of similar design. The most reliable sources say that they were commercially available from 1958 through 1960.

A brief history of the bonded core bullets starting with P.O. Ackley's original design and ending with North Fork's HG (Heavy Game) version. (1) P.O. Ackley .308 caliber 180 gr. circa 1949-51; (2) Jack Ashurst (Jax Dies) .308 caliber 220 gr. 1958-60; (3) Bill Steigers (Bitterroot Bonded Core Bullets) .375 caliber 300 gr.; (4) North Fork .308 caliber 180 gr. and (5) 200 gr. HG.

That next step in evolution was left to none other than the designer of the daddy of all bonded bullets, Bill Steigers of Bitterroot Bonded Core Bullets. In the late '60s, Steigers sold a product based on the Ackley design but improved with his own core bonding process. He had Ackley's permission to call it the Ackley Style Solid Base Expanding Bullet.

However, since this was before we had reliable and (relatively) cheap CNC equipment, this bullet was so labor intensive that Steigers eventually dropped the Ackley design and went back to his own homegrown and already perfected design, which, by the way, will always be known as the bullet that started the bonded era and to which all other bonded bullets are (or should be) compared.

As with everything else in this industry, there is rarely something completely new. You just find different people doing it. The Ackley design has been copied by many (myself included) over the past 50 years.

In addition to tweaking the internal design to improve the range of usable terminal impact velocities, my primary contribution to the evolution of the type was to put relief grooves in the solid section of the bullet.

Solid sections, especially of soft copper, have always had two inherent problems as a result of forcing an essentially solid object down a rifled barrel – increased fouling and possible pressure spikes. In a solid sectioned bullet, there is nowhere for the material displaced by the rifling to go. In a full length lead cored bullet, the deformation of the lead core actually makes room for the displaced jacket material.

Not so in the case of a solid sectioned bullet. But by adding grooves in the solid section you give the material displaced by the rifling lands an easy (lower stress) escape route. If the stresses between the bullet and the barrel are kept below the sheer strength of the jacket material, that material is not going to be ripped from the jacket and deposited within the barrel.

Terminal Performance

I wanted North Fork bullets to perform over the widest impact velocity range possible. The useable impact velocity range of a bullet is the velocity at which the bullet first opens to the size of a useful, lethal mushroom, subtracted from the max impact velocity that the bullet can withstand and still remain intact (i.e., one piece).

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In other words, I wanted the bullet to open at low impact velocities AND remain intact at the maximum impact velocity that could be expected from any specific caliber. There are many bullets on the market that will perform well in a narrow velocity range of as little as 300 to 400 f.p.s.

There are bullets in the North Fork product line that have a useful impact velocity range of 2000 f.p.s. Most will operate in the over 1500 f.p.s. range. None will operate in less than a 1000 f.p.s. range, but that is mostly because guns or cartridges that can drive them fast enough to find out if they'll do more simply don't exist.

North Fork .416 caliber, 370 gr bullets recovered at progressively higher impact velocities.
1735 f.p.s. / 99.5% retention; 2000 f.p.s ./ 99.4%; 2200 f.p.s. / 99.3%; 2400 f.p.s.
/ 97.8%; 2600 f.p.s. / 95.0%. The core bonding process achieves 95% weight retention
even at 2600 f.p.s. impact velocity.

When we talk about terminal performance, we also have to consider the balance between penetration and trauma inflicted. Now, the controversy over this one will start more barroom brawls than "tastes great/less filling." I'm not trying to fan any flames because the true believers on both sides of the fence will never be swayed. Luckily for everyone, there are products out there to satisfy both camps.

My observation, based on several thousand impact tests, is that penetration and trauma inflicted are polar opposites. If you want more of either one, you have to give up some of the other. Bullets that make small holes penetrate deep. Bullets that make big holes penetrate shallow.

At North Fork, we wanted maximum inflicted trauma with ENOUGH penetration. "Enough" is another loaded word that can have as many meanings as there are people to define it. To me, "enough" means that the bullet always penetrates through the vitals of the animal and on to the hide on the far side. Once it has reached the offside hide, it doesn't matter to me whether it exits or not. The maximum amount of destruction to the vital organs has already been done. For the record, I believe that it is a penetration failure if a bullet does not reach the offside hide, even from a 45-degree shot angle.

The large calibers are more likely to be found under the offside hide than the smaller calibers. There are two reasons why – the physical construction of the animals they are used on and the impact velocities of those bullets. Where I have samples or photos of 15 or more large caliber bullets recovered from larger African animals, the number of smaller calibers (284, 308, and 338) retrieved from animals (mostly raking shots on elk and moose) is so small the whole lot of them could fit in the watch pocket of your Levis.

How to control penetration and trauma? By limiting the size of the mushroom. This is where the often over-worked marketing term "controlled expansion" comes in. That term has been so overused, misused and otherwise abused that the customer usually places no credence in it whatsoever. That puts it in the same category as the even more abused marketing term "premium."

As I see it, controlled expansion means the expansion is STOPPED, not just in a narrow impact velocity range but over the entire range of impact velocity. This requires a physical barrier to further expansion. If there is no physical barrier, there is no "controlled expansion," at least by my definition of the term.

In a conventionally constructed bullet with a core that extends the full length (or nearly so) of the bullet, there is no way to limit the formation of the mushroom and consequently no way to control penetration over a wide impact velocity range.

L-R North Fork bullets .416 370 gr.; .423 380 gr., and .458 450 gr.

All bullets have a penetration profile. Picture a graph with the x (horizontal) axis representing impact velocity and the y (vertical) axis representing inches of penetration. At low-impact velocities below the velocity that initiates expansion, ALL bullets will penetrate to a great depth, as long as they remain stable.

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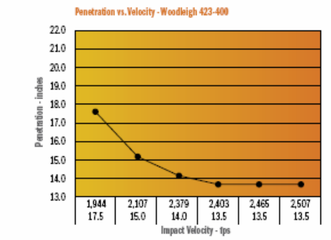
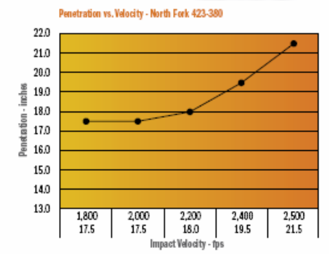


The .423 caliber 400-gr Woodleigh expanding bullet is an excellent conventional design that demonstrates the decrease in penetration as impact velocity increases.



In contrast, the North fork .423 caliber 380-gr bullet actually continues to penetrate with increase in impact velocity.

But this is irrelevant to outcome. An even slightly pointed expanding bullet that does not expand inflicts about as much trauma as stabbing the animal with a hypodermic needle. The classic example of this is the animal that is shot at such a great distance that the bullet does not open and therefore inflicts no immediately lethal trauma. The result, more often than not, is a wounded animal that is lost.

Back to the graph – once the conventional bullet begins to mushroom, the penetration is reduced by the drag of the mushroom. In a conventional bullet (bonded or not) penetration continues to decline as the impact velocity increases.

Penetration of a North Fork bullet is also going to slow once expansion is initiated due to drag. The difference is that once the North Fork bullet reaches a velocity of approximately 2100 f.p.s., there is no more lead to feed the mushroom and it stops expanding.

How does that affect penetration? On our graph, the North Fork's penetration, like other bullets, starts very high at impact velocities that do not cause mushrooming. As the impact velocities increase and the bullet begins to mushroom, penetration decreases until the size of the mushroom stabilizes. From that point on, as impact velocities increase, so does penetration.

So the graph shows a line that decreases until approximately 2100 f.p.s. and then the line reverses and continues to go up along with the impact velocity. Somewhat counter intuitively when compared to conventional bullets, with North Fork bullets higher impact velocities result in increased penetration.

I often tell customers not to intentionally reduce the velocity of North Fork bullets if they are expecting increased penetration. If you are looking for more penetration, reducing the velocity will not get you there.

Folks often ask why North Fork bullets, especially the larger calibers, are offered in unusual weights and sectional densities that are less than "traditional."

Two reasons:

First, the limited amount of core, which allows us to control the size of the mushroom, means that the remaining weight of the bullet by necessity is made up of the jacket material. Since jacket materials are approximately 80 percent as dense as lead, a bullet of "traditional" weight would be too long.

That in itself is problematic. Twist rate of a rifle doesn't care about the weight of the projectile; it only cares about the length. A too-long projectile can be unstable from a standard rate twist. That instability can show up in the air (accuracy) and/or in the animal (penetration). Either way, it renders the bullet useless.

An overly long bullet also robs available powder space from the cartridge. In some cartridges (the .416 Rigby, for example), this isn't really a concern. But in cartridges like the .416 Taylor and Remington, it is a problem.

The second reason North Fork bullets come in "non-traditional weights" goes back to velocity. An increase in weight would reduce velocity. In a North Fork bullet, less velocity equals less penetration.

Our extensive testing over the years has shown us that a maximum sectional density of ~.305 gives the best balance of weight, powder room, velocity and penetration FOR THE DESIGN OF THIS PARTICULAR BULLET.

When it comes to expanding bullets, speed kills and more speed kills better IF the bullet is up to the task structurally and there is no reduction in penetration. The people who want to argue that point are basing their assumptions on conventionally constructed bullets (bonded or not) that have been the norm for 100 years. For the newer generation of bullets – North Forks included – those assumptions no longer apply.

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