Gerard **25 February 2010, 13:26**

Terminal Bullet Performance
This is the post, now deleted, that I respond to below:

quote:

I may have shit up my nose , perhaps in my mouth but last time I looked I do not believe that I have shit for brains.

So where are we at this point?

The consensus seems to be that angular velocity sets the bullet up for a specific impact yaw angle and that the size of that yaw angle determines in-target behavior.

Now from this the AR experts assume, and correct me if I'm wrong that based on observation a fast twist barrel will give better impact yaw angles than slower twist barrels based on observations of deeper penetration.

In fact across the board there are participants who routinely promote, de novo that fast twist barrels be used.

This then would imply that each and every gunbarrel maker that has ever built a barrel to what can be seen as "standard" or "CIP spec " don't know what they are doing and are idiots !

Lets look at this closely:

Why is it that the faster twist barrels consistently outpenetrate "traditional" and "CIP standard" slower twist barrels for the currently tested FN monometal bullets ?

The reason is because the faster twist barrels are actually the correct twist for these bullets.

The monometal FN made of copper or brass is consistently longer than a comparable weight lead and copper FMJ.

Based on the Gyro theorem, or it's simplified and oft misapplied derivative the Greenhill formula we see that the correct twist for a monometal would have to be faster than that of a standard lead and copper FMJ or soft.

That means that "like weight" Monometal Solids are usually then understabilized when shot from standard barrels and thus have large yaw angles throughout the flight trajectory.

But this raises some interesting questions:

Does this apply if the shooter is to shoot a FN bullet made of copper and lead?

Will the fast twist still give smaller yaw and thus bigger penetration?

Or lets say we make our FN from a heavier metal than solid copper or brass (copper clad tungsten) so that it's length is the same as the old copper and lead bullet ?
Would the fast twist barrel now still give better penetration?

If say a 1: 10 barrel gives better penetration than say a standard 1:14 twist barrel for a monometal why not go 1:9 or even 1:7 ? because then you are going to get even better penetration ?????

Well not quite:

The Gyro theorem comes with caveats and an important caveat is the relationship of gyroscopic stability and the condition of tractability.

There is a direct inverse relationship between static stability and tractability.

If the angular velocity is too high the bullet becomes less tractable. Which implies that the bullets yaw angle increases. This in turn has a significant impact on in target stability and the wounding process. (this is undisputed in the wound ballistics literature)

The bullet will sit at an angle to it's direction of motion as it exits the barrel, they all do but because of the relative high ratio of its gyroscopic moment due to the high spin rate to the overturning moment, will keep this position and take longer to damp out slow arm gyratrion , it also does not cone out as much as a bullet that is shot from the correct twist barrel , in fact it gets worse downrage. (True overtabilization does not really occur in flat fire trajectories but the yaw angle is none the less quite high)

The whole issue of yaw, stabililty and wounding capability is best illustrated and likely the best researched in the form of the M16 rifle and it's variants and ammunition

The M16 and its ammo may very well be the most researched in this regard and serves as a very good example of my position on this in action.

The oiginal M16 was designed for the M193 bullet and was made with a 1:12 Barrel.

The vital stats for this bullet is:
Mass: 3.56gm
Length: 19mm
Ja: 1.165
Jq: 0.763
Distance nose to CG: 11.3mm

The original barrel twist calculated for these vitals called for a 1:12 twist barrel and extensive testing done comparing this to a 1:14 twist barrel showed that the 1:12 would give the best performance over the whole temperature and barometric spectrum called for in a battle rifle of this nature.

The launch and flight characteristics of the M193 bullet also showed the best overall results in terms of initial Yaw, coning and overall loss of velocity over distance when compared to the 1:14 twist.

What was noted on impact of the bullet in the bullet stop in the lab at Aberdeen was that often some the bullets fired from the 1:14 would not penetrate the water saturated foam used as a bullet trap at the end of the range.

But along came NATO and they chose a heavier bullet, the SS109:

The vitals for the SS109 is:
Mass: 4 gm
Length: 23.1mm
Ja: 1.096
Jq: 1.123
Distance nose to CG 14.5mm

This bullet does not stabilize in the 1: 12 inch barrel, just like the M193 in the 1:14

So NATO chose a 1:7 barrel.

The US is part of NATO and to appease the NATO STANAG regulations changed some M16' models to 1:7 twists. The FN MINIMI and the US derivative of the MINIMI has two barrel twists, a 1:12 for the M193 bullet and a 1:7 for the SS109 bullet

This in practice meant that the 1:7 barrel should stabilize the SS109 bullet and would based on the commonly assumed AR expert standard even stabilize a M193 bullet better?
Right? .....Wrong !

The 1:7 overstabilizes the M193 bullet in as much as it leads to a larger Start yaw and the bullet remains at that large yaw way longer than when shot from a 1: 12 barrel and this lead to reports of bullet fragmentation at impact, something that was extensively researched and documented.

My point in all of this is:

Modern monometal solids are longer than their " old" Lead and Copper FMJ's .

Based on the gyro theorem old style FMJ 's and cup and core bullets are a best fit with "standrard CIP " twist barrels.

When shooting modern monometals the barrel twist will have to adapted for by shooting faster twist barrels.
It means that if the new green bullet initiative takes hold organizations like CIP would have to revise their specs in terms of twist rates for cartridge. But it has a caveat if one chooses the fast twist barrel it may not be the best fit for old style bullets.

And just as a sidebar:

Starting yaw is not a fixed value, it is a random value within a lower and upper limit, it varies from shot to shot same rifle, shot to shot different rifles.

Distance to damping of nutation (fast arm rotation) is random and may vary shot to shot same rifle, shot to shot different rifles even by as much as a feet and yards ! this was shown at Aberdeen and cited by two different testers)

Yaw measured at different points in a trajectory same thing, loss of velocity same thing all are random between an upper and lower limits.

Yaw is also temperature and barometric pressure sensitive again within a background of randomness.

So everything we see and assume has to be given the statistical treatment.

Intesresting reading:
Sturdivan LM, Bexon R: A unified yaw-penetration model for bullets. Aberdeen, Md ., U.S. Army Chemical Systems Laboratory, 1982

Larry Sturdivan was one of the expert witnesses that was called for the JFK assasination hearings, his testimony is public knowledge and can be googled. His explantions regarding yaw at these hearings are interesting and as Vapo pointed us to an article he found will fit perefectly Wink

Alf,

quote:

> but last time I looked I do not believe that I have shit for brains.

This is an interesting thought. The question is, would it cause a bigger temporary cavity (explosion) with a high speed cylinder impact than if you had brains for brains? I think that it would vary, depending on whether you suffer from cranial constipation or cranial diarrhea. Such are the variables of terminal ballistics.

quote:

> This then would imply that each and every gunbarrel maker that has ever built a barrel to what can be seen as "standard" or "CIP spec " don't know what they are doing and are idiots !

No, they are not idiots. They built barrels for lead core bullets and to achieve a certain terminal result. (At least some of them did.) CIP and SAAMI spec was laid down long before the superiority of mono solids was realised and their use became more common. That is why any mono solid manufacturer with brains for brains will recommend a bullet of similar length to the former leadcore solid. The fact that it runs faster, without giving up it's good properties on impact, is a bonus and there is no need to rebarrel existing rifles. Only a (village) idiot would suggest that. If a custom rifle is built on a tighter twist the additional advantage of more momentum can be employed, if case capacity allows it.

quote:

> Why is it that the faster twist barrels consistently outpenetrate "traditional" and "CIP standard" slower twist barrels for the currently tested FN monometal bullets ?

Partially true: Faster twist also improves the terminal performance of ogived, lead core solids.

quote:

> The reason is because the faster twist barrels are actually the correct twist for these bullets.

Not true: Whatever the twist, you select the correct mono that suits it.

quote:

> The monometal FN made of copper or brass is consistently longer than a comparable weight lead and copper FMJ.

This red herring is true and the reason why one would choose a mono that is the same length (but lighter) than the usual lead core solid.

quote:

> Based on the Gyro theorem, or it's simplified and oft misapplied derivative the Greenhill formula we see that the correct twist for a monometal would have to be faster than that of a standard lead and copper FMJ or soft.

Correct again - If they were the same weight, which they are not, because anyone with brains for brains will select a copper or brass mono that is the same length as, but lighter than, the usual lead core bullet. Please don't quote Greenhill when we discuss monos. It does not work and serves only as an example of GIGO.

quote:

> That means that "like weight" Monometal Solids are usually then understabilized when shot from standard barrels and thus have large yaw angles throughout the flight trajectory.

You know this so why build a non existent argument around it? However, note that lower SF numbers produce "large yaw angles throughout the flight trajectory."

quote:

> The Gyro theorem comes with caveats and an important caveat is the relationship of gyroscopic stability and the condition of tractability.

You should not be going here.

quote:

> There is a direct inverse relationship between static stability and tractability.

This is correct but you should not be bringing this up.

quote:

> If the angular velocity is too high the bullet becomes less tractable. Which implies that the bullets yaw angle increases. This in turn has a significant impact on in target stability and the wounding process. (this is undisputed in the wound ballistics literature)

This is true and also the reason why you should not be mentioning this. **Typically, at what distance from the muzzle is this problem of tractibility seen?** I may have asked this before but it is amongst your unanswered, deleted posts.

quote:

> Starting yaw is not a fixed value, it is a random value within a lower and upper limit, it varies from shot to shot same rifle, shot to shot different rifles.

This variance is known. **What is it in fractions of a degree?**

quote:

> Distance to damping of nutation (fast arm rotation) is random and may vary shot to shot same rifle, shot to shot different rifles even by as much as a feet and yards ! this was shown at Aberdeen and cited by two different testers)

You have these distances: **Please tell us what they are.**

quote:

> Yaw measured at different points in a trajectory same thing, loss of velocity same thing all are random between an upper and lower limits.

The parameters are known: **Please tell us what they are.**

buffalo **25 February 2010, 13:48**

Hi Michael. Will measure tonight and post what I find..
I agree that meplat on the AGS solids are definately on the small side.. But regarding stabilisation then it might work in a 1-14" barrel though.. The AGS solids are considerably shorter in length compared to the 400 grs Barnes Banded solid or similar bullets.. Now I havent got any 350 grs Barnes Banded in the 416 caliber, but my guess is, that the length of this bullet will be close to the 400 grs AGS solid????

someoldguy **25 February 2010, 14:14**

quote:

> I believe that a meplat of 78% in conjunction with a nose profile like the GS Custom wth sharp and not rounded shoulders will get the most penetration.

Mainly because of the outstanding performance of the Woodleighs that we've all seen, I would agree that a 78 percent meplat is definitely still in the "Good Zone." But also more desirable for stability is the sharp shoulder instead of the rounded. So I could understand why such a bullet would be a great penetrator.

I'm beginning to come to the conclusion that the reason that rounded bullets in general aren't as stable as their "flatter" counterparts is mainly a matter of traction. (Think of a bad tire on wet pavement.)
But like so many of my conclusions in this field of study, this could change.

Glenn

michael458 **25 February 2010, 14:34**

quote:

> Originally posted by someoldguy:
>
> The meplat looks way small, I agree. I haven't measured any meplats, but I could understand the problem if you're using a caliper. The only thing I could think of sounds ridiculous. Take a dark crayon, some lipstick or something similar, cover the meplat surface with it, and daub the meplat on a clean piece of paper, being careful not to smudge it. Then you can measure your mark on the paper with the caliper. It probably won't be precise, but it would undoubtedly be less aggravation.

Glenn

A splendid idea I think! A very simple solution it seems, good thinking! I will try that and see how it comes out.

Jim
Excellent research as always! Thanks!

Alf

Glad to see you are in fact OK--Was getting a bit concerned, but happy we did not have to mount a "rescue" mission on your behalf!

Michael

http://www.b-mriflesandcartridges.com/default.html

The New Word is "Non-Conventional", add "Conventional" to the Endangered Species List!
Live Outside The Box of "Conventional Wisdom"

I do Not Own Any Part of Any Bullet Company, I am not in the Employ Of Any Bullet Company. I do not represent, own stock, nor do I receive any proceeds, or monies from ANY BULLET COMPANY. I am not in the bullet business, and have no Bullets to sell to you, nor anyone else.

michael458 **25 February 2010, 15:10**

quote:

> Originally posted by Gerard:
>
> [QUOTE] This then would imply that each and every gunbarrel maker that has ever built a barrel to what can be seen as “standard” or “CIP spec “ don’t know what they are doing and are idiots !

No, they are not idiots. They built barrels for lead core bullets and to achieve a certain terminal result. (At least some of them did.) CIP and SAAMI spec was laid down long before the superiority of mono solids was realised and their use became more common. That is why any mono solid manufacturer with brains for brains will recommend a bullet of similar length to the former leadcore solid. The fact that it runs faster, without giving up it's good properties on impact, is a bonus and there is no need to rebarrel existing rifles. Only a (village) idiot would suggest that. If a custom rifle is built on a tighter twist the additional advantage of more momentum can be employed, if case capacity allows it.

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Gerard

Excellent answers, and some very important points made that we should all understand. All the twist rates we use and that have become standards today were established long before our current crop of mono solids, and other new FMJ bullets. I dare say that today we have more variety of fmj and mono solid bullets than ever before in history, and I also dare say that more are in use today than ever before. While the bullets have been around for some time, Jack Carter the Trophy Bonded, your GSC bullets, and the old RN A-Squares and Barnes, the general shooting public has very little knowledge of these bullets because of their limited use in general. Today, more and more shooters are more aware, obviously demanding more from them, take a look at our current crop, new solids or FMJs coming every day because of more demand. We are just now beginning to understand these bullets and the way they behave and perform.

While someone like yourself has put a tremendous amount of study and effort into getting the bullets where they are today, shooters like myself are only beginning to understand them and the many many related factors that make the bullets perform better. No, the major manufacturers of barrels do not know this yet, even some of the major bullet makers are not there yet either! But in some defense of these folks they have to concentrate efforts on the majority of use for their products, and the ignorance of the general shooting public on the matter of solid bullets.

But there is something brewing for sure with all the major bullet manufacturers. Witness Barnes, Hornady, Nosler, and even the old standby RN people, Woodleigh, all with FN solids now! And more coming down the road. Look at the barnes Buster? From Barnes I

can't believe them making the little 330 gr Barnes Banded for 458 Socom? That's a god send to me, for lighter bullets in the 458 B&M, this matches perfect with all my 300-400 gr bullets and a perfect compliment to the NonCons and expanding bullets for that. Now why in the world would they do that? Demand for solids is getting to be more and more, that could be the only reason I could think of! If demand was not there, they would not produce! I love solids and use them on every hunting trip, regardless of whether it's kudu or buffalo, I like backing up with solids with known performance!

As demand increases, so will the knowledge behind the bullets. While Gerard has been there some time, the rest of us are catching up as fast as we can, and we are getting there! But it is not an easy road either, there are and always will be the old standbys that don't wish to let go of the past! In the end however the writing is on the wall, the rein of the FMJ round nose bullet is over!

5 years ago, and up until just recently some of you have heard me say many many times "Nose Profile" is everything! Right, heard me say that? Well for me that is still true, BUT I have now learned that just because it has a flat meplat of sorts, don't make it perfect, and for sure all flat meplat bullets are not created equal! We are learning that meplat size is all important, and even just a couple of percentage points can make a tremendous difference, to the point that other factors take over, such as twist rates we are now learning, or at least I am. Some of you are far ahead of me in many areas. We are learning where that cutoff point is for meplat size, not there yet, but getting closer! We are learning that there are many factors involved with getting the performance we desire, deep, straight line penetration.

We have a great group assembled here to investigate these matters, and it is an interesting journey. Thanks to all!

We will "endeavor to persevere"!

Michael

http://www.b-mriflesandcartridges.com/default.html

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jwp475 **25 February 2010, 16:47**

quote:

> Originally posted by someoldguy:
>
> quote:
>
> > I believe that a meplat of 78% in conjunction with a nose profile like the GS Custom wth sharp and not rounded shoulders will get the most penetration.
>
> Mainly because of the outstanding performance of the Woodleighs that we've all seen, I would agree that a 78 percent meplat is definitely still in the "Good Zone." But also more desirable for stability is the sharp shoulder instead of the rounded. So I could understand why such a bullet would be a great penetrator.
>
> I'm beginning to come to the conclusion that the reason that rounded bullets in general aren't as stable as their "flatter" counterparts is mainly a matter of traction. (Think of a bad tire on wet pavement.)
> But like so many of my conclusions in this field of study, this could change.

I came to that conclusion shooting big bore handgun bullets into medium simular to what micheal458 and the other gentleman is doing now. I came to this conclusion from the results observed. I believe that we would observe the same results with the faster velocity of the rifles as well

---

A 9mm may expand to a larger diameter, but a 45 ain't going to shrink

Men occasionally stumble over the truth, but most of them pick themselves up and hurry off as if nothing had happened.
- Winston Churchill

MikeBurke **25 February 2010, 16:53**

quote:

> Originally posted by ALF:
>
> quote:
>
> > your statement is refuted by recent tests conducted by Mike70560. The following sequence of quotations fully demonstrate that a modern FN monometal bullet outperform the traditional early 20th century FMJ bullet even when fired utilizing a traditional slow CIP standard twist rate…in this case a 1:20” twist rate in a

double rifle

sadly and as much as I would like to conldude anything for that actual firing of only two shots and comparing we cannot deduct anything.

IN rder to prove at a trend many shots need to be taken just a Sturdivan, McCoy and Piddington all from Abrdeen have shown and secondly I am not convinced that the target as much as we try is actually uniform so we may deduct anything from it.

When we look a Youngs work on the determination on nose shape as a factor in peneration of materials we see tet went to great lengths to standardise on the targets used, in this case sand carfefully ,sifted,sorted weighed and wetted to a certain degree of water saturation

Actually every Woodleigh I have fired at different velocities and different test medias has behaved the same. It is way more than 2. At around 20" they all start to veer and tumble.

Every North Fork I have fired at different velocities and different test medias has behaved the same.
Straight as an arrow, and penetration was very consistant.

How is it I can fire four North Forks in the same media through 72" of wet newspaper and they penetrate a piece of plywood in the end of the box to equal depths in an almost perfect straight line and it is repeatable.

How is it I have a hard time firing four Woodleighs in the same newspaper because they vear off course so much their paths begin to cross.

I was going to stop testing the 470 Nitro because everything has been so conclusive, but this weekend I will perform at least one more test in yet another media.

I look at an animal as varying media. Differing thickness of skin, skulls, rib bones, shoulder bones, leg bones, heart, liver, stomach, hip all different. To me it is the most inconsistent thing we shoot.

Why is it in different tests, in different parts of the country, different calibers, different testers we are coming up with similar results?

Woodleighs have worked in the field for years and even now for me shooting plywood, newspaper, magazines, wood, hardiboard, water, etc is all good but the real test will be on elephant.

As far as consistency of the media. Every similar test I performed with Northfork bullets using different batches of media the bullet stopped in nearly the identical location in the test box. It gave me confidence the media was consistant.
If you read several of the tests I fired were Woodleighs and North Forks in the same wetpack. So if there were inconsistencies (very minor) both bullets saw the same inconsistencies.

RIP **25 February 2010, 21:22**

Hooray! Good work men!
Alf is being dragged kicking and screaming from the goat's ass!
But he keeps trying to stick his head back in!

No one wants to admit that the cavitation produced by the bullet nose slamming through the media produces a vacuum effect in the cavity around the bullet?
The bullet is spinning inside a relative vacuum, not in a medium 1000 times denser than air.
Spin continues to steer the bullet inside the cavity, the sides of the bullet are not "wetted."
The FN bullet is much more effective at slamming the reactive (exponential-function-resistance) media aside.
A spinning bullet inside a cavity is clearly seen in many high speed films of transparent gelatin or water.
Google the Larry Sturdivan testimony at the JFK hearings, for his expert witness detailing descriptions of this.
The spitzer bullets of the M16 yaw and tumble much more quickly inside the medium.
They are not as efficient in cavitation and shoulder stabilization. Ditto the RN solids.
The FN solid has help from greater cavitation and shoulder stabilization at the nose, as well as the shorter CG to CP distance advantage, and the gyroscopic stability of the spin is allowed to work for a longer period of time.
Spin continues to help inside the target,
as well as at the transition from air to target.

Twigs and leaves and dirt and all sorts of debris gets sucked into wounds by the temporary cavity vacuum as it slams shut behind the bullet.
That's real.
Not theory.
That is more beef in the bun.

The eggheads have just not done enough work with FN bullets.
Their bullets are as pointy as Alf's head, goat suppository that it is.
"Men Who Stare at Goats."
Goats get really nervous around the pointy headed.
Texas Heart Shots on goats work better with faster twist barrels and FN solids,
better than with a slow-twist, pointy, human head.

"Indians Vow to Endeavor to Persevere" until the truth is known.
THERE IS IRON IN THOSE WORDS

like beef in the bun.

DWright **25 February 2010, 21:30**

Just wanted to pipe in and express what a great thread this has become. Lot's of great information for those that are not interested in turning it into a pissing match. I think more valuable information has been created here than all the others stuffed together.
Great job Michael, and all taking part!

O, and. . . . . Alf. . . . . can you hear me. . . ? Are you in there. . . .? Hello. . . . . .

http://www.mazamasportinggoods.com

PWS **25 February 2010, 22:52**

The question was poised regarding modifying a old style RN mono.

I've tried this. My bullet test tube was a plywood baffled "ladder" that I was able to submerge in the North Pacific off the side of a large dock. The baffles were 24" square and staged at 12" intervals. I was then able to fire down into the fixture to record the bullet path in saltwater.

Discussion has also centered around relative meplat diameters. In my tests, those flats changed the bullet completely varying with the diameter of the flat. From a wild, unpredictable tumbler to a straight drilling projectile.

Bullets in the above photo:

1. standard Barnes RN Mono
2. #1 but with grooves to move CG forward of CF
3. #1 with FN and second crimp groove (0.325" meplat)
4. #1 with hemisphere completely removed (0.448" meplat)
5. self designed "super semiwadcutter" (0.325" meplat)
6. #5 with relief grooves.

My notes indicate:

1. Capable of penetrating 2' straight and stable, keyhole at 3', always deviates outside of 24"square before 5' of penetration
2. Completely unstable. Believe it's moreso an issue of poor engraving leading to large angle of attack. Nonetheless, weight forward did nothing beneficial in target as entry baffle recorded a round hole.
3. Penetrated straight beyond ninth baffle, recovered resting on tenth.
4. GEYSER upon firing, penetrated beyond sixth baffle, recovered on seventh
5. & 6. Multiple shots, recovered between ninth and tenth baffle, always straight, always stable

Regarding different meplats on modified Barnes RN monos:

Standard RN - 2' stable, 2' wild, gone before 5'
0.275" meplat - stable beyond 10', not recovered
0.325" meplat - stable beyond 9', recovered before 10'
0.375" meplat - stable beyond 7', recovered before 8'
0.448" meplat - stable beyond 6', recovered before 7'

These were all fired in a 1:14 twist .458Lott, approximately 480 grain projectiles, loaded to approximately 2200fps, from 30' above the surface of the water.

capoward **25 February 2010, 23:02**

quote:

> The bullet is spinning inside a relative vacuum, not in a medium 1000 times denser than air.
> Spin continues to steer the bullet inside the cavity, the sides of the bullet are not "wetted."
> The FN bullet is much more effective at slamming the reactive (exponential-function-resistance) media aside.
> A spinning bullet inside a cavity is clearly seen in many high speed films of transparent gelatin or water.
> Google the Larry Sturdivan testimony at the JFK hearings, for his expert witness detailing descriptions of this.

Makes perfect sense to me.

> quote:
>
> The spitzer bullets of the M16 yaw and tumble much more quickly inside the medium.

Least we forget the M16's were originally designed by the military for war in Europe against the Soviet army. Their bullets were designed to penetrate opposing soldier helmets beyond 300yds. Unfortunately all the tiny 5.56mm bullet would typically case in up close jungle warfare was an equally sized tiny hole in the opposing soldier which hampered their mobility very little or not at all unless a critical organ was impacted such as the brain or the spine. So the military went through testing of different barrel lengths and different bullet lengths, weights, etc. until the military settled upon a bullet combination that still provided long range accuracy but would upset within the body cavity in order to induce maximum damage due to the tiny bullet diameter. I still remember some of the military footage of firing the modified/improved M16s (don't recollect the exact nomenclature these modified/improved M16s were referred to as) against jungle trees and shredding them…it was very impressive how they changed a rifle/bullet combination that punched tiny holes in trees to a combination that would shred the trees.

Jim
"Life's hard; it's harder if you're stupid"
John Wayne

capoward **25 February 2010, 23:21**

> quote:
>
> Originally posted by someoldguy:
>
> > quote:
> >
> > What's Life Without a Little Fun?
> >
> > Oh No, he is at it again
>
> I know it's your ancestors, Dr M, but the one with the black hair reminds me of the lead guitarist in Thin Lizzy. Just a coincidence I guess.
>
> > quote:
> >
> > Regarding different meplats on modified Barnes RN monos:
> > Standard RN - 2' stable, 2' wild, gone before 5'
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> >
> > These were all fired in a 1:14 twist .458Lott, approximately 480 grain projectiles, loaded to approximately 2200fps, from 30' above the surface of the water.
>
> Thanks for sharing these test results!
> FWIW, my penetration model didn't fare so well here with the water penetration.
>
> Here are my predictions:
>
> .275 meplat -- 11 feet (OK)
> .325 " -- 8 feet (mkay)
> .375 " -- 6 feet (somewhat off)
> .448 " -- 4 feet (a good bit off)
>
> Anyway, keep the tests comin', guys! My nipples are hard with expectation!

Glenn,

Fully understanding that your test challenge is directed to the .458caliber FN bullets…but considering much of the background work being performed regarding metaplat size is to determine proper dimension percentages usable across the bullet caliber world...would you perhaps prefer change your exact metaplat size to dimension percentages?

Different meplats on modified .458 caliber Barnes RN monos:
0.275" meplat - 60.0% metaplat
0.325" meplat - 70.9% metaplat
0.375" meplat - 81.8% metaplat

0.448" meplat - 97.8% metaplat


Jim 
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John Wayne

ALF **25 February 2010, 23:41**

.

boom stick **25 February 2010, 23:47**

With non deforming flat nose solids I think it needs a new SD category. Call it the Weight to meplat SD or WMSD.

If you have a 60% Meplat on a 480 grain .458 bullet making the frontal area (not the bullet diameter) of about .275"

This gives an ASTONISHING SD or WMSD of .907!!!!! talk about a WMD

577 BME 3"500 KILL ALL 358 GREMLIN 404-375

we band of 45-70ers (Founder)
Single Shot Shooters Society S.S.S.S. (Founder)

someoldguy **25 February 2010, 23:53**

> quote:
>
> No one wants to admit that the cavitation produced by the bullet nose slamming through the media produces a vacuum effect in the cavity around the bullet?
> The bullet is spinning inside a relative vacuum, not in a medium 1000 times denser than air.

That's never occurred to me. Too much to think about already.

It has occurred to me that the hole that is being punched into the target is oftentimes much larger than just the bullet diameter. (But that's not an easy thing to quantify.) This has led me to question whether there's much wetting of the bullet surface at all. But since it's observable that the bullet continues spinning inside the target, I don't see much room for debate about the role that spin plays in penetration.
(Get ready, Gerard.)

Glenn

someoldguy **26 February 2010, 00:02**

> quote:
>
> With non deforming flat nose solids I think it needs a new SD category. Call it the Weight to meplat SD or WMSD.
>
> If you have a 60% Meplat on a 480 grain .458 bullet making the frontal area (not the bullet diameter) of about .275"
>
> This gives an ASTONISHING SD or WMSD of .907!!!!! talk about a WMD

That's the assumption I've been using in my penetration formula, whenever the meplat is known. Trouble is, very small meplats don't behave in the way that they should in the real world. I'm sure Michael has observed this too, so he likes a meplat of no less than 65 percent of bullet diameter.
Much smaller meplats than the caliber "should" be able to penetrate extremely well, no doubt, but it would appear that their problem is stabilization.

Glenn

boom stick **26 February 2010, 00:39**

Too small of a meplat won't act as a true FN.

A true FN's nose profile should be such that the only contact with the game should be the meplat.

> quote:

Originally posted by someoldguy:

quote:

With non deforming flat nose solids I think it needs a new SD category. Call it the Weight to meplat SD or WMSD.

If you have a 60% Meplat on a 480 grain .458 bullet making the frontal area (not the bullet diameter) of about .275"

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577 BME 3"500 KILL ALL 358 GREMLIN 404-375

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Single Shot Shooters Society S.S.S.S. (Founder)

boom stick **26 February 2010, 00:42**

P.S. I think the FN makes the bullets path more predictable even if Alf's "Angle of attack" is off a bit. I think similar bullets of FN and round nose with the same yaw would prove the superiority of the penetration path of the FN.

577 BME 3"500 KILL ALL 358 GREMLIN 404-375

we band of 45-70ers (Founder)
Single Shot Shooters Society S.S.S.S. (Founder)

ALF **26 February 2010, 00:59**

.

boom stick **26 February 2010, 01:05**

I bet the wound channel on number four would be awesome in comparison.

quote:

Originally posted by PWS:
The question was poised regarding modifying a old style RN mono.

I've tried this. My bullet test tube was a plywood baffled "ladder" that I was able to submerge in the North Pacific off the side of a large dock. The baffles were 24" square and staged at 12" intervals. I was then able to fire down into the fixture to record the bullet path in saltwater.

Discussion has also centered around relative meplat diameters. In my tests, those flats changed the bullet completely varying with the diameter of the flat. From a wild, unpredictable tumbler to a straight drilling projectile.

Bullets in the above photo:

1. standard Barnes RN Mono
2. #1 but with grooves to move CG forward of CF
3. #1 with FN and second crimp groove (0.325" meplat)
4. #1 with hemisphere completely removed (0.448" meplat)
5. self designed "super semiwadcutter" (0.325" meplat)
6. #5 with relief grooves.

My notes indicate:

1. Capable of penetrating 2' straight and stable, keyhole at 3', always deviates outside of 24"square before 5' of penetration
2. Completely unstable. Believe it's moreso an issue of poor engraving leading to large angle of attack. Nonetheless,

weight forward did nothing beneficial in target as entry baffle recorded a round hole.
3. Penetrated straight beyond ninth baffle, recovered resting on tenth.
4. GEYSER upon firing, penetrated beyond sixth baffle, recovered on seventh
5. & 6. Multiple shots, recovered between ninth and tenth baffle, always straight, always stable

Regarding different meplats on modified Barnes RN monos:

Standard RN - 2' stable, 2' wild, gone before 5'
0.275" meplat - stable beyond 10', not recovered
0.325" meplat - stable beyond 9', recovered before 10'
0.375" meplat - stable beyond 7', recovered before 8'
0.448" meplat - stable beyond 6', recovered before 7'

These were all fired in a 1:14 twist .458Lott, approximately 480 grain projectiles, loaded to approximately 2200fps, from 30' above the surface of the water.

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ALF **26 February 2010, 01:13**

.

boom stick **26 February 2010, 01:23**

DWG's now DCB's (Dangerous Cinder Blocks)

Grrrrrr evil Cinder Block

This "Sculpture" made of cinder blocks gives me an idea. Instead of Rip's Iron Buffalo maybe we need a Cinderbuffalo lol

577 BME 3"500 KILL ALL 358 GREMLIN 404-375

we band of 45-70ers (Founder)
Single Shot Shooters Society S.S.S.S. (Founder)

RIP **26 February 2010, 01:56**

All y'all,
I am volunteering for the rescue mission to British Columbia, if I can get the USAF to fly me and a couple of PJs in.
PJs and I will rendezvous by C-130 landings on a dirt strip or a segment of Alcan Highway gravel, closed to traffic for the landing.
Then a helicopter will meet us for the final approach.
Alternatively we could orbit the site of Alf's tryst with the goat, taking pictures of the crime scene before we parachute in (either HALO or LALO, it don't matter to me) from the C-130s.
Parachuted illumination flares and night-vision gear will be used as needed, day or night.
We laugh at the snow and cold. Love it!

Since I have operated on goats shot in the butt with an M16 (Combat Casualty Care Course, ATLS), successfully resuscitating them before doing other experiments on them under anesthesia,
and have rescued drunken civilian (native) hunting lodge keepers from interior Alaska in the dead of winter, via C-130 and Chinook, I feel confident that I can save the goat, or at least ease its suffering.
The PJs will have protective gear to deal with decontaminating and reviving Alf.
They are not Hillbillies.

Macifej **26 February 2010, 02:03**

ah-ah-ah-ah-ah-allllffff ...!!

RIP **26 February 2010, 02:10**

quote:

> Originally posted by Macifej:
> ah-ah-ah-ah-ah-allllffff ...!!
>
> 

Alf,
Cute goat, eh?
It is a Boer Goat.
A little piece of home.
Not ba-aa-aa-aa-d at all! 

capoward **26 February 2010, 02:13**

quote:

> Originally posted by ALF:
> Anyone bothered to look at Young's nose profile factor and the penetration of penetrators into materials.
>
> Interesting stuff.
>
> What is better a FN profile or a round nose profile (Very important though the penetrators have to remain stable ie 0 deg yaw)
>
> What's better, FN or RN?
>
> In concrete, if the concrete is not thick then FN is better because it causes Scabbing, that helps penetration.
>
> If the concrete is thick then the round nose hemispehere is the best.
>
> What about soil? Rn is better than FN
> ?
>
> In each of our target types (by mcahnical properties as I have cited before) Young's nose shape factor has been tested and proven.
>
> The important point though is stability and this is where wound ballistics becomes complicated.
>
> All oblong projectiles no matter what their nose shape are unstable and have to be stabilized. In practice there is not a bullet that has a true zero degree yaw

Alf,

I doubt that more than a very few participants in this thread have Young's publication or even ready access to it…so how about jumping to the end of the book for us and identifying Young's proven "optimal nose profile" for use against:
1) A very large very powerful thick-skinned heavy-boned game animal that can become extremely dangerous extremely quickly… such as…say a wounded bull elephant or even a large cape or water buffalo?
2) A large durable skinned plains game animal…such as...say a Greater Kudo or perhaps a Cape Eland?

Thanks in advance for helping those of us who are library and research challenged.

Jim 
"Life's hard; it's harder if you're stupid"
John Wayne

ALF **26 February 2010, 02:21**

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someoldguy **26 February 2010, 02:53**

quote:

> What is interesting is that once the translational velocity drops to below 200 fps the bullets sides also become wetted now drag goes up and this can be seen in Gelatine, the cavitation grows right at the end of the tract, The cavity size being a function of drag.
>
> In muscle at the end of the tract, because it's elastic the hole closes completely behind the bullet and one often will

find the bullet in muscle without a visible tract, one can see it under the microscope though.

That's interesting. It even makes some sense.

Glenn

RIP **26 February 2010, 06:18**

I want to isolate one factor for a test: twist rate
100% increase in revs per second.
20" twist increased to 10" twist: The only variable.

Constants:
.458 caliber bullet, 400-grain Barnes Buster with marginal meplat size.
2000 fps
SIM-TEST:
-most homogeneous/consistent/repeatable/nonvariable
-dynamic equivalent elasticity with temporary cavitation that closes up (smaller than caliber permanent wound channels)
-and practical ... if you have goat lab capability use ordnance gelatin instead ...

A second "one variable" test with North Fork .458/450-grain FP solid at same velocity in 10" and 20" twists, an ultimately better bullet than the Buster, surely.

Then a velocity variance, single-variable test x 2, with fast and slow loads in each twist, same best-quality bullet: North Fork FP

The arguments for the cumulative evidence of complex wetpack and board media is sound in my mind, but it is inherently impossible for single variable isolation in any one "test."
You have to "simplify" in dealing with insufferable head-in-goat-disorder-afflicted critics.
Give them no excuses to whine.
Take no prisoners.
Having Alf's head where the sun don't shine must be worse than a ball and chain.
Poor goat!

ALF **26 February 2010, 06:40**

.

465H&H **26 February 2010, 06:44**

Ok guys you have gone too far with ALF. He presents a scientists point of view and in my opinion his is as good as your if not better, I can't believe that you would resort to ridicule as you have done rather than argue facts.

465H&H

RIP **26 February 2010, 06:45**

Alf elopes with his goat ... one more time ... as the inmates of ar.com look on in dismay.

quote:

Originally posted by 465H&H:
Ok guys you have gone too far with ALF. He presents a scientists point of view and in my opinion his is as good as your if not better, I can't believe that you would resort to ridicule as you have done rather than argue facts.
465H&H

465H&H:
One does not "argue" facts, one states the facts and then faces them.
It is Alf who will not face facts.
He wants to argue all around the facts.
He is just fooling around the facts. No beef in the bun.
I am 55 years old and will not suffer fools. Maybe I have to suffer them professionally, but not in leisure time, even older fools!
Some folks here take themselves way too seriously.

Letter Rip!

ALF **26 February 2010, 07:01**

.

RIP **26 February 2010, 07:04**

Alf,
I have posted to you many times over the last 10 years.
I have mostly been ignored. Why continue beating my head against your wall?
Been here in one handle or another since 1999.
Maybe we will cross paths someday.
Be glad to share a campfire with you.
Let's hope it is not in that really hot place that we meet.
Rip

capoward **26 February 2010, 07:18**

quote:

> Originally posted by ALF:
> RIP:
>
> Thank you for that and with that said I think it's time to take my leave from AR. I can take it on the chin as much as the next man but really at my age and time in life to be subjected to this, nah not worth the effort.

quote:

> Originally posted by 465H&H:
> Ok guys you have gone too far with ALF. He presents a scientists point of view and in my opinion his is as good as your if not better, I can't believe that you would resort to ridicule as you have done rather than argue facts.
>
> 465H&H

H,

I took you at your word earlier in this thread that Alf was very knowledgeable, had a wealth of experience, and would be a valuable contributor to the thread. From this I did ask Alf questions to increase my knowledge, benefiting from his, and did receive some responses that addressed the questions but only once received a direct response to the question posed rather than much language not directly related to the question posed.

I've no idea the background behind the obvious issues that Alf, Rip, Gerard, and a few other individuals have but I now think that I have a better understanding of their frustration in attempting to maintain an ongoing discussion with Alf.

On page 38 of this thread I posed two questions to Alf totally based off of his statement in an earlier on the page due to my not having access to the book or research paper that he quoted.

Alf did post to "someoldguy" directly after my post but never answered my question.

What I find now is that Alf has deleted all of his posts on page 38 and most likely other pages as well and replaced the entire text with a . (period) which to me is not presenting a scientific view to the discussion. I also now see why a few other participants in this thread a few pages ago would immediately quote Alf…presumably to preserve his contributions, opinions, and statements…so that thread readers would better understand the ongoing discussions – perhaps this is the ongoing thorn between Alf and others on the AR. I don't know, I haven't been around AR long enough to be fully aware. But I'm definitely getting enlightened in the discussions within this thread.

So…Alf is withdrawing from the thread discussion, no problem…due to his deletions of the content of his posts on past pages of this thread should he post again I'll most likely just ignore it as it'll likely disappear fairly quickly so no need to expend energy in attempted discourse.

Cheers.

Jim 
"Life's hard; it's harder if you're stupid"
John Wayne

31/2Makesmelaugh **26 February 2010, 10:23**

Instead of me reading 39 pages of posts (I have read most of them), could we get someone to summarize the proven knowledge that we have gleaned from these tests? How about a cliff-notes version?

Thanks a ton!

"Archery enshrines the principles of human relationships. The Archer perfects his form within himself. If his form is perfect, yet when he releases he misses, there is no point in resenting those who have done better than him. The fault lies nowhere."(Confucious)

N E 450 No2 **26 February 2010, 10:36**

Here you go... Baised on MY actual observations of shooting animals in the field, not any "test medium" or any theories...

When it comes to the penetration of Solids[bullets that do not expand]...

Spitzer bullets will tumble.

Hemisherical [sp] solids penetrate the least.

Bullets like the old Hornady steel jacketed Solids and the steel jacketed Woodleigh Solids, penetrate plenty deep enough on cape buff, giraffe and elephants.

North Fork Flat Point Solids penetrate much deeper that any other RN solid that I have used.

Tests I have read about indicate that in a .458 diameter, a one in ten twist gives deeper straight line penetration than a 1 in 16 or a 1 in 14.

Too big a flat point tends to lessen penetration. Too small a flat point, lessens penetration.

DOUBLE RIFLE SHOOTERS SOCIETY

michael458 **26 February 2010, 15:34**

31/2

We have done quite a bit here, a short version is difficult. Expanding, NonCons (Non Conventional Expanding) and of course SOLIDS. Proven? Some will say yes, some will say no. Proven to me, both in the field and in the test medium. I do both, and have done both extensively enough to be satisfied with the results.

Let's try to summarize the solids and what we have seen thus far.

This applies to .416 caliber and up. And in particular .458 and up, as I still have ??? with 416.

1. Flat Nose solids in general penetrate deeper and straight, and maintain stability further than Round Nose solids.

2. The size of the flat meplat is a very important factor, just because it has a flat nose, does not make it a perfect deep diver. The "Deeper we Dive" into this subject, Pun Intended, the more we learn. Not proven, still working on it, however MY THEORY is that we need a minimum of 65% meplat of caliber for the bullet to stabilize itself during terminal penetration, if that % falls under that, then twist rate becomes very important and the faster twists will assist in stabilizing that lower % meplat better for deeper penetration. Now, my 65% meplat number is fluid, at one time I felt that was closer to 60% but as we continue to learn, I needed to adjust that upwards.

3. With a meplat going upwards to 68% and more, the flat meplat tends to take over as a main factor in deep and straight penetration. A few points below 65% and we need to look at twist rates very seriously to assist in stability the get deeper, straighter penetration.

4. A round nose solid or fmj cannot compete with a proper designed flat nose solid for straight, and deep penetration. It looses stability in many different tests, with many different mediums, including animal tissue. While in MOST cases it does provide enough penetration to get the job done in the field, it is still inferior to the flat nose solids regardless of medium.

5. Sectional Density!!!! Arm Chair Terminal Ballistic Experts will tell you that SD is the most important factor, because that is what they read somewhere from ANOTHER Arm Chair Terminal Ballistics Expert! NOT TRUE!!! SD will only have bearing with two bullets that are of the same exact construction, with the same exact nose profile, at tje same velocity, the higher SD is the key factor, but all these other factors must be the same. For example 458 caliber, 330 gr Barnes banded with an SD of .225 vs 458 caliber 500 gr Barnes Banded with an SD of .341--the 500 gr bullet will penetrate deeper. In the case of the 330 gr Barnes Banded and a 500 gr RN Woodleigh FMJ--the 330 gr Barnes Banded will penetrate deeper, as NOSE PROFILE takes over and is the leading FACTOR in straight line penetration, even over the much greater SD.

6. Velocity is a factor much the same as SD. Bullets of the same construction, same nose profile and same SD, in 99% of the tests I conducted a higher velocity will penetrate deeper than the lower velocity. I do add to this by saying within my capabilities here which with most bullets I have tested the upper velocity range has been around 2500 fps. I cannot comment on velocities running higher than that. Two solid bullets, same nose profile, same SD, same everything, except velocity, a bullet started at 2500 fps will penetrate deeper than a bullet started at 2100 fps--as a rule of thumb. I know this is a little vague, but this is still being studied by me and I don't have a 100% answer for this just yet. Still working on it!

7. Choosing a proper bullet for your rifle and twist rates are ALL IMPORTANT. As even I have learned recently. Know what your twist rates are, and choose a solid that will go with it. In the case of my 416 B&Ms with a 1;14 twist rate they WILL NOT stabilize a 400 gr mono solid. They will stabilize a 350-370 gr mono solid, so it is all important that I go to the field with a proper bullet. As my calibers go above 416 caliber, to 458 and in particular .500 caliber, even in an undesirable twist rate a large flat nose meplat does assist in stabilization, which is the case in some of my 70% meplat for caliber .500s in a 1:18 twist. Of course penetration is improved and stability improved with a 1;12 in that same caliber. So one must know ones rifle, caliber, cartridge, and barrel, and choose proper.

What is the best SOLIDS? Trouble with this one, everyone has a favorite, including me. Depending upon many factors!!!!!!!!! In 458 and 416 I like Barnes banded, North Fork, GSCs all top of the line, hard to go wrong with any of them, look at your twist rates, case capacity, velocity, and choose proper weights to stabilize. Coming down the pike, the new Woodleigh Monos are ugly as hell, but what I have tested has been a deep diver and they look good for the future. The Rhino solids tested very good, a bit larger meplat I feel would help a bit at the end of penetration with stability, however they had already went as far and much further than needed to begin with to accomplish any mission in the field.

Round Nose Solids or FMJs? In Calibers 416 and above, I think they are inferior designs myself, when compared to a proper flat meplat solid. That does not say they won't do the job in the field, as they have and they will. For those that hang onto the old design RN solids and want to put up a fight or fuss, I have used them, I have shot elephant, hippo and a bunch of buffalo with them, so kiss my ass, I am not saying they won't work, I am saying there is better and the better, more reliable solids are the flat nose meplat solids we have today. No more, but certainly no less. There are RN profile solids in smaller calibers that I believe are better than the available tiny meplat flat nose solids, in particular the 320 gr Woodleigh FMJ in 9.3 caliber, it's superb in it's straight

line penetration, however it is not the same nose profile as the bigger caliber round nose fmj bullets.

On the fly, that's about as short as I can cut it, and I could have even missed something along the way, as this becomes very in depth, and somewhat complicated as we move forward.

Factors to keep in mind--NOSE PROFILE--% meplat of Caliber--Twist Rates--Velocity--SD--Construction or materials bullet is made of--

How's that, I miss anything guys?

Michael

http://www.b-mriflesandcartridges.com/default.html

The New Word is "Non-Conventional", add "Conventional" to the Endangered Species List!
Live Outside The Box of "Conventional Wisdom"

I do Not Own Any Part of Any Bullet Company, I am not in the Employ Of Any Bullet Company. I do not represent, own stock, nor do I receive any proceeds, or monies from ANY BULLET COMPANY. I am not in the bullet business, and have no Bullets to sell to you, nor anyone else.

michael458 **26 February 2010, 15:42**

GERARD

Before I forget, you asked some many posts ago what twist rate my 9.3s were, I only found out a few days ago, they are 1:12 twists.

Guys

As you see above I have now placed quite a bit of import to twist rates, where in the past I never really gave it much thought, nor concern. You can take it to the bank I intend to know more about my twist rates today, than I did 5 yrs ago! Today, I pay a great deal more attention to this factor as being one of very great import because of some of the things I have learned during the test work. Some will claim and have claimed that I waste my time here, I beg to differ with that. I don't see it that way at all. In fact, I wonder if those nay sayers are just too damn sorry and lazy to do the research, to make the effort and would just rather sit back and play "Bwana" and accept things as they have always been? Not me, I want to go to the field with the very best I can go with, I have a mission, I will not fail my mission, I will go to the field with the very best equipment, bullet, and knowledge possible in which to complete my mission in a proper manner! I wish to continue to learn what is best and I am, You others, do as you please.

Michael

http://www.b-mriflesandcartridges.com/default.html

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someoldguy **26 February 2010, 15:47**

> quote:
>
> Factors to keep in mind--NOSE PROFILE--% meplat of Caliber--Twist Rates--Velocity--SD--Construction or materials bullet is made of--
>
> How's that, I miss anything guys?

Nope! Looks like all beef to me!

Glenn