

The Ultimate in Very Long Distance Military Shooting The .408 CheyTac[®] Cartridge and Firing Platforms

A White Paper

Abstract:

This paper proposes a system where US snipers can engage targets at very long distances – distances so long, that enemy return fire cannot reach them.

The Problem:

A major battlefield strategy is “engage the enemy at distances greater than which the enemy can engage you.” US snipers use the 7.62mm NATO cartridge – a .30-caliber cartridge available in numerous sniper rifles manufactured around the world.

The US military has moved to a .50-caliber sniper rifle system. The .50-caliber projectile (bullet) goes farther and delivers more kinetic energy (knock down power) than the .30-caliber projectile. The .50 BMG cartridge was designed in 1918 as an anti-tank round – minor changes have been made since that date. Systematic testing has not been conducted to determine whether the .50 BMG is the ideal cartridge for very long-range shooting.

The US military is in the final stages of awarding a 3000-rifle contract for .50 BMG semiautomatic sniper rifle. This White Paper proposes that this is not the best system available.

Long Distance Military Shooting:

Four years ago, Professor John D. Taylor saw the need to improve the over eighty year old .50 BMG cartridge design and as a result, spearheaded a group of extremely talented individuals to form a company called CheyTac[®]. Their purpose was to create the ideal very long-range sniper cartridge. The concept of “**Balanced Flight**” (patent no. 6,629,669) is the basis for long-distance accuracy. Using PRODAS software that allows engineers to test all known physical parameters that a projectile encounters in flight, the theory of **Balanced Flight** was proven. The .408 CheyTac[®] cartridge embodies **Balanced Flight** and as a result greatly outperforms the .50 BMG cartridge in speed, range, accuracy, and even power.

Note: While *Balanced Flight* can improve the ballistic characteristics of the .50 BMG projectile; when compared, the .408 CheyTac is overall superior.

Utilization of *Balanced Flight* to Build a Very Long Range Sniper Rifle System:

Advantages of the .408 CheyTac[®] cartridge over the .50 BMG cartridge include:

- More compact
- ~50% less weight
- Greater kinetic energy (beyond 400 yards)
- Shorter time to the target
- Greater velocity to the target
- Superior accuracy
- Engages targets at greater distances
- Remains supersonic longer for greater accuracy
- Less primary recoil due to lighter projectile
- Greater raw materials savings in manufacturing.

In the hands of a trained shooter, the CheyTac[®] cartridge can hit a man-size target at 1.5 miles and beyond. Because the CheyTac[®] cartridge is designed to shoot great distances, a hand-held advanced ballistic computer (patent pending) was designed to provide ultimate solutions within seconds for accurate elevations and windage settings. The CheyTac[®] computer compensates for all known physical conditions that will affect projectile trajectory including ammunition temperature (burn rate) and the Coriolis Effect (earth rotation while the projectile is in flight).



Comparison of the .408 CheyTac[®] cartridge with other cartridges. From left to right: .50 BMG, .408 CheyTac[®], .338 Lapua Magnum, .300 Winchester Magnum, 7.62mm NATO) and 5.56mm NATO.

The .408 CheyTac[®] is approximately one-third smaller and lighter than the .50 BMG.

To take advantage of the ballistic characteristics of the .408 CheyTac[®] cartridge, CheyTac[®] designed and builds two firing platforms using a newly invented barrel rifling (patent pending) with an OPSINC suppressor (silencer). A turn-bolt receiver design was chosen over semi-automatic receiver design to insure maximum accuracy. One design (Model 200) has a collapsible stock and a removable barrel – ideal for high altitude parachute jumps. The other design (Model 300) has a titanium receiver and carbon fiber-wrapped barrels for reduced weight and is fitted in the same stock (McMillan A4) currently used by military 7.52mm NATO sniper rifles – making initial training easier.

Advantages to the US Army of the CheyTac® rifles over the .50 BMG rifle include:

- Greater choice in rifle designs to fit combat missions
- Suppressed noise for silent shooting
- Requires less training than the bullpup design
- Ergonomically easier to shoot, thus improved accuracy
- Two turn-bolt receiver designs gives superior accuracy compared to a semi-automatic receiver design
- Greater reduction of secondary recoil (McArthur muzzle brake design)
- Does not expel gases into shooters' eyes (McArthur muzzle brake design)
- Easier to shoot. Not as demanding as the .50 BMG resulting in reduced training time.

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CONCLUSION

The .408 CheyTac® is a superior cartridge to the .50 BMG in all of the critical ballistic characteristics as well as in numerous factors important to successful military field tactics. It, as well as its firing platforms, could be tested immediately and compared to the .50 BMG platform currently under consideration. Such testing, should demonstrate the numerous advantages of the .408 CheyTac® over the .50 BMG and as a result, the system should be a priority consideration for adoption by the US Army.

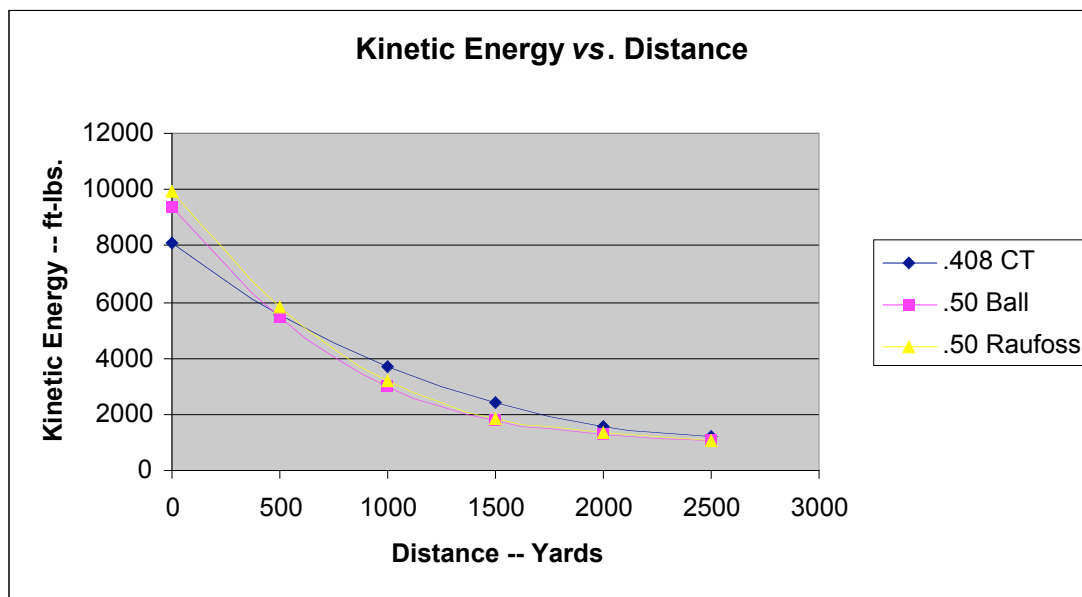


Model 200



Model 300

Appendix I

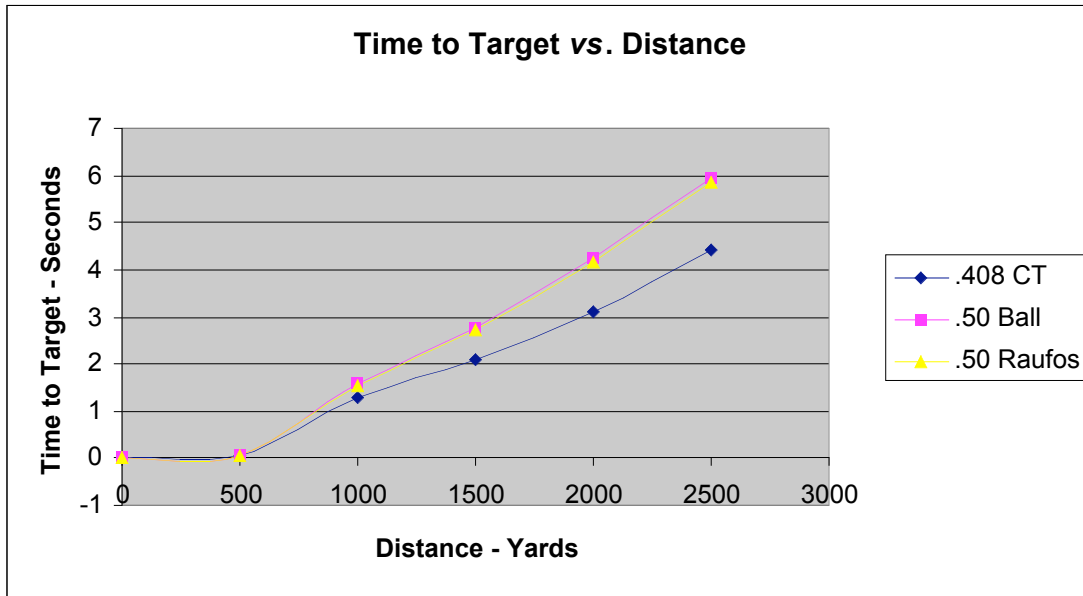


Note: The .50 Raufoss cartridge was designed as an improvement over the .50 Ball cartridge. Data indicates that kinetic energy profiles are very similar.

The .408 CheyTac[®] kinetic energy surpasses the .50 Ball and the .50 Raufoss at approximately 400 yards and maintains the lead beyond 2500 yards (1.42 miles).

In supervised tests, the .408 CheyTac[®] projectile penetrated armor and laminated glass that were resistant to the .50 BMG projectiles (*US Armed Forces Journal*, August 2003)

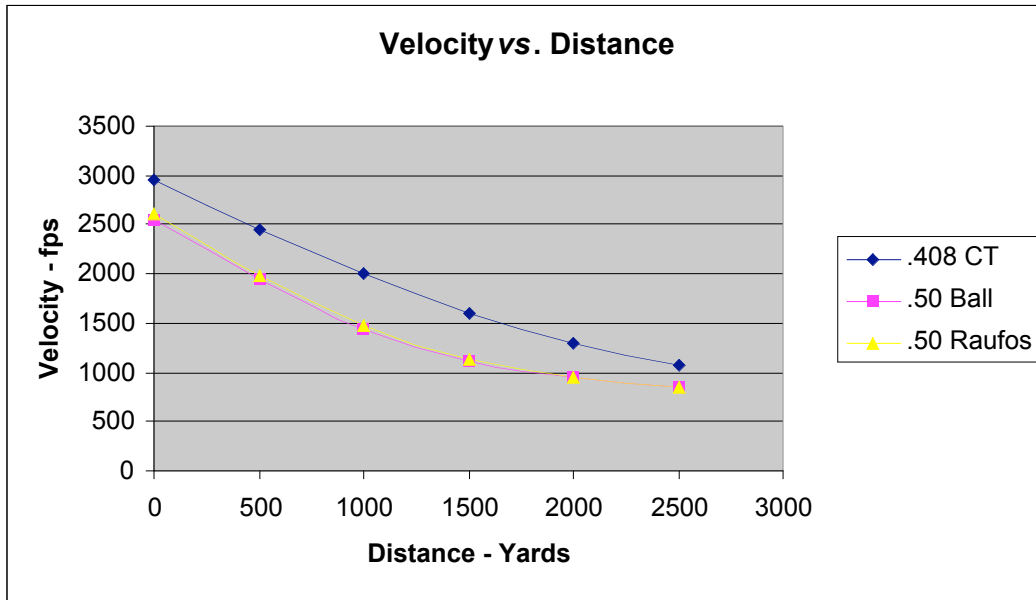
All data is based on flight data obtained by Doppler radar during testing at US Army Yuma Proving Grounds, 18 June 2001.



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At 1000 yards the .408 CheyTac® projectile exceeds the .50 BMG projectile by approximately 1 second and at 2500 yards (1.42 miles) by approximately 1.5 seconds.

All data is based on flight data obtained by Doppler radar during testing at US Army Yuma Proving Grounds, 18 June 2001.



Note: The .50 Raufoss cartridge was designed as an improvement over the .50 Ball cartridge. Data indicates that kinetic energy profiles are very similar.

The .408 CheyTac® projectile was designed to penetrate the atmosphere with the least amount of resistance. It remains supersonic to 2400 yards, while the .50 Ball and the .50 Raufoss projectiles remain sonic to only 1700 yards.

The .408 CheyTac® projectile remains stable as it passes through the transonic zone and remains on its original trajectory path (Balanced Flight – patent pending). However, the .50 Ball and .50 Raufoss projectiles undergo extensive vibrations through the transonic zone, resulting in their departure from their original trajectory paths.

All data is based on flight data obtained by Doppler radar during testing at US Army Yuma Proving Grounds, 18 June 2001.

Appendix II

Types of ChecTac® Projectiles.

There are currently three projectile types:

419gr. Heavy Ball (HB). The standard ball round is a 419gr. solid copper nickel alloy projectile. These projectiles are turned on a CNC lathe-machining center and display a .945 ballistic coefficient over a 3500-meter range average. This is the standard load for long-range precision applications.

305gr. Battlefield Domination Round (BDR). The 305gr. BDR round is used for rapid defense engagements from the rifle out to 1000. The maximum ordinate of this projectile over the 1000 yards range is 48 inches. The operator places an rifle sights elevation setting of 1000 yards and then aims at the mid thigh point of any target from 0 to 1000 yards away. The high velocity (3500 fps) and low maximum ordinate makes the flight time extremely short (1 second to 1000 yards), which makes the gun able to engage targets to 1000 yards about every 3 seconds. It is much less time for a semi-automatic gun. The normal data needed, such as range, winds, and environmental conditions are not needed at such high velocities.

Additional Rounds under Development. These types of projectiles are under development.

400gr. High Performance Armor Penetration (HPAP). ChecTac® is testing a tungsten carbide penetrator, high performance armor-piercing round for the 308gr and 419gr .408 ChecTac® calibers.

Tracer. A conventional, visible tracer round will be available for inter-linking and use in semi-auto and bolt action systems.

Infrared Tracers. An infrared tracer will be developed for use at night and in day operations. The advantage of an IR tracer in the daytime is that the operator can observe his shot trace through filtered night vision sights. One of the greatest problems in extreme range shooting is that it is often impossible to see the shot "trace" or impacts of the rounds. This makes corrections for a second shot impossible. By observing an IR trace of the shot, an observer is able to make second shot corrections, or "walk in" shots in the MG or mini-gun role.