ATK Force on Force: Developing the Right Response

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ATK Sporting Group

GUNSLICK · FEDERAL PREMIUM AMMUNITION · CHAMPION Traps & Targets · RCBS · FUSION · ALLIANT POWDER · CCI · speer · Outers · NITREX · WEAVER · Ram-Line

EAGLE

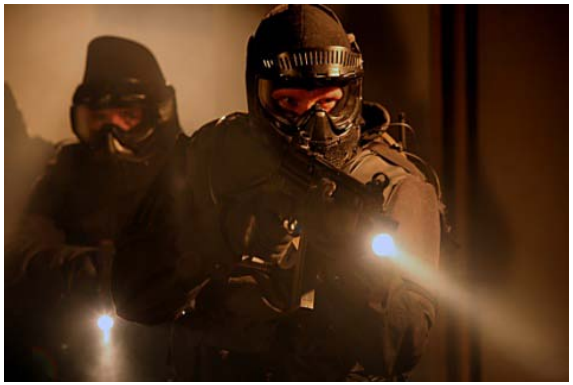
BLACKHAWK!

A growing portfolio of market-leading brands

- Headquartered in Anoka, Minnesota
- Sporting and hunting ammunition
- Law enforcement and security forces ammunition
- Propellant for reloaders and ammunition
- Shooting sport accessories
- Tactical systems and accessories for:
  - Military customers
  - Law enforcement and security markets
  - Consumer markets

Presentation Objectives

- Force on Force Program
- NLTA Technology
- Ammunition
- Accessories/Training Instruction
- Questions



Force on Force Systems Approach

Today's warfighters must provide the right response to rapidly changing, complex situations. The need to train not only small arms proficiency but also decision making and force escalation under these circumstances is essential. ATK's Force on Force (FOF) product line teaches the warfighters in a safe environment using reduced-energy, non-lethal rounds fired from converted weapons.

FOF Products line

- Ammunition
- Training Equipment
- Shoot House and Interactive Target Systems
- Firearm conversion kits

Training Program

- Manual
- Classroom Instruction

Training Round Requirements

CCMCK

- ✓ Compatible with current equipment and gear
- ✓ Standoff Distance 1m
- ✓ Accurate
- ✓ Performance at all temps
- ✓ Soluble marking media

ATK FOF

- ✓ Lead Free
- ✓ Marking on soft tissue
- ✓ Safe 1-Foot Standoff
- ✓ Negligible Damage to Structures
- ✓ Independent of Barrel Length
- ✓ Independent on Barrel Life
- ✓ Negligible Barrel Fouling

FOF - Ammunition Design

ATK NLTA Technology:

1. Ignition/Propulsion System:
   - ✓ Single Primer Driven
   - ✓ No Additional Energetics
   - ✓ Orifice Regulated

2. Projectile Design
   - ✓ Fully Encapsulated
   - ✓ Copper Driving Band
   - ✓ Marking Media

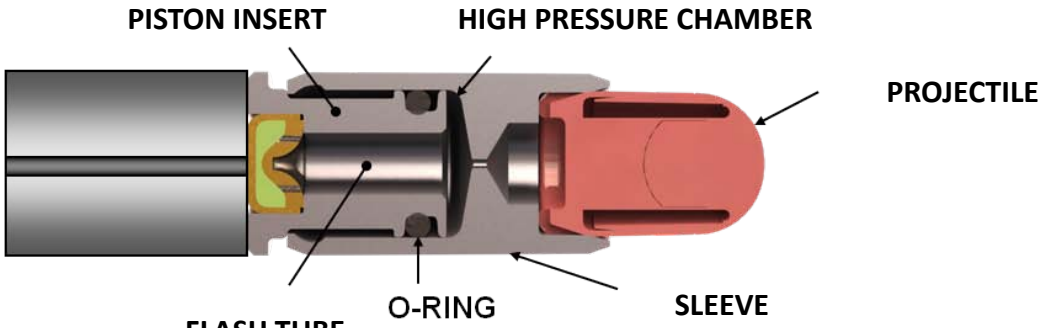
9mm

5.56mm

Overall System Description – FOF Cartridge

STAGE 1

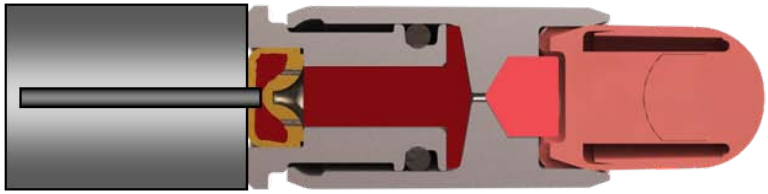
UNFIRED ROUND



STAGE 2

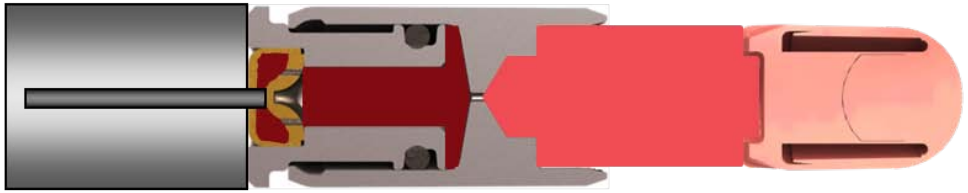
FIRING PIN IGNITES PRIMER

(PROPULSION SYSTEM)



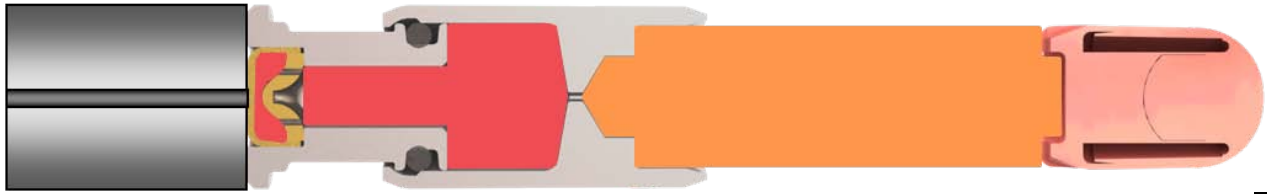
STAGE 3

PROJECTILE SEPARATES



STAGE 4

PISTON TELESCOPES TO CYCLE WEAPON



Modeling Results – Primer Driven System

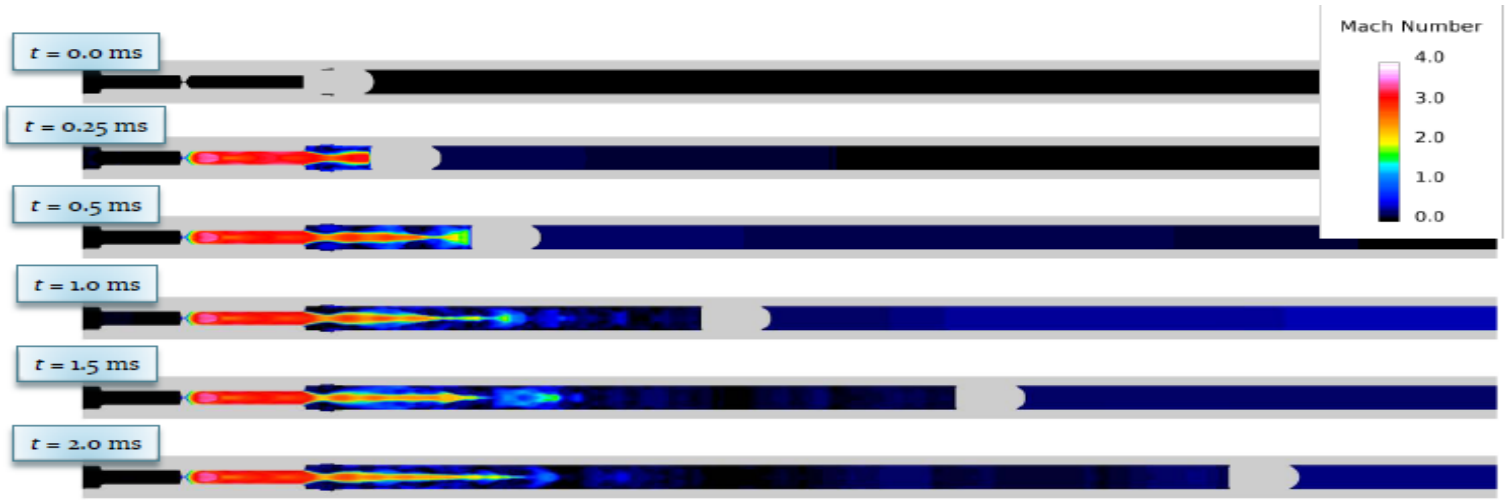
Ignition / Propulsion System:

- Single Primer Driven
- No Additional Energetics
- Orifice Regulated

Southwest Research Institute was hired to simulate the 5.56mm Marking Round with a Computational Fluid Dynamics (CFD) model.

$$\frac{\partial \rho}{\partial t} + \frac{\partial \rho u_i}{\partial x_i} = 0 \qquad \frac{\partial \rho u_i}{\partial t} + \frac{\partial \rho u_i u_j}{\partial x_j} = -\frac{\partial P}{\partial x_i} + \frac{\partial \tau_{ij}}{\partial x_j} + \rho g_i \qquad \frac{\partial \rho C_v T}{\partial t} + \frac{\partial u_j \rho C_v T}{\partial x_j} = + \frac{\partial}{\partial x_j}\left(k \frac{\partial T}{\partial x_i} \right) + \dot{Q}_v'''$$

Nicholas J. Mueschke, Ph.D.
Research Engineer
Computational Mechanics
Department of Engineering Dynamics
Southwest Research Institute

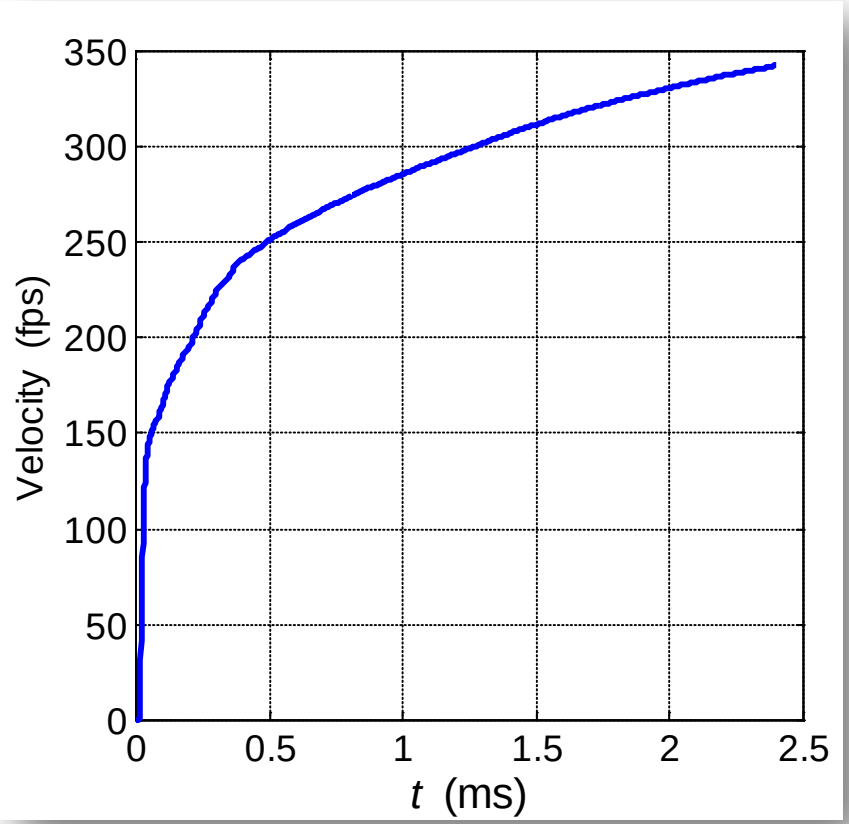


Modeling Results – Primer Driven System

Baseline Projectile Statistics

- Presence of a high velocity, low pressure jet that starts the bullet down the bore for the first 3-4 inches

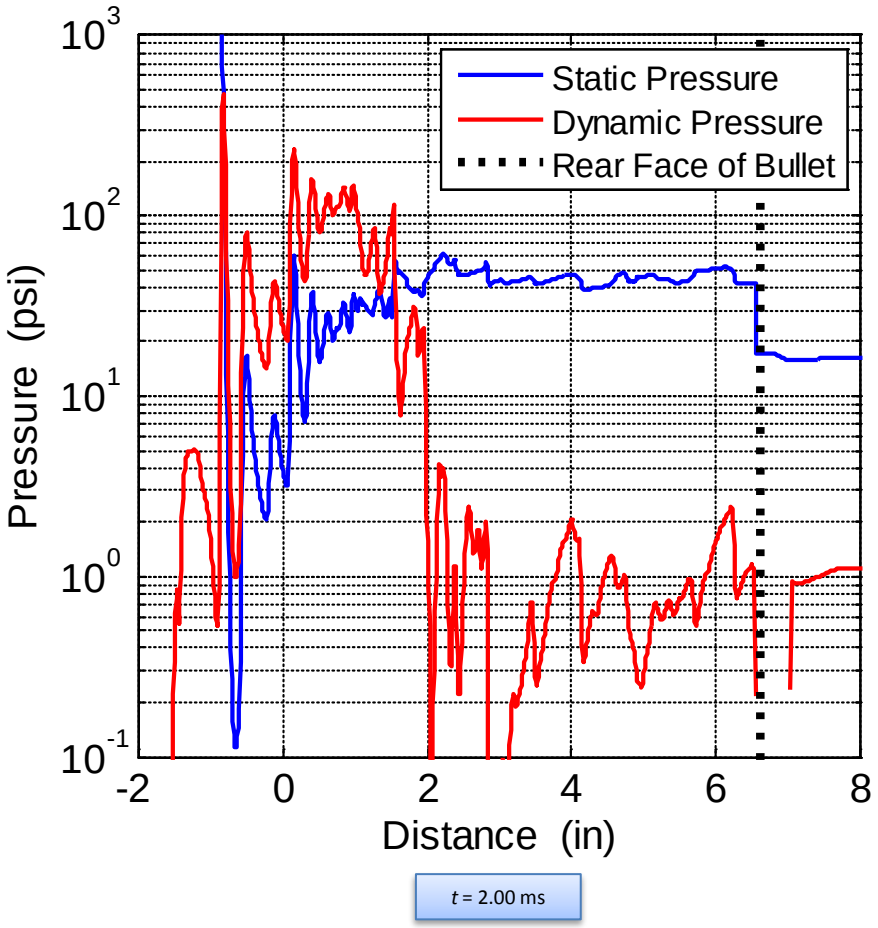
- Static pressure in the bore continues the bullets' acceleration after 3-4 inches



Modeling Conclusion

The total pressure of the gas acting on the rear face of the projectile is due to:

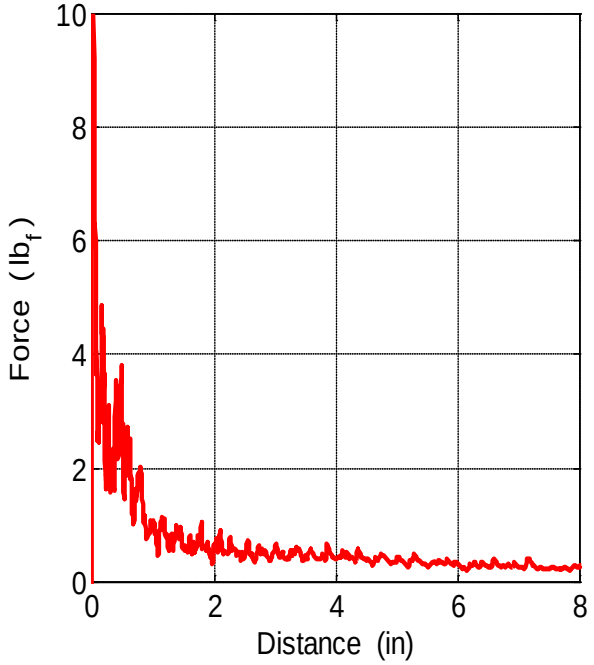
- The build up of pressure in the barrel by the release of primer gases (static pressure)
- The impact of a high velocity gas jet on the projectile's rear face (dynamic pressure)



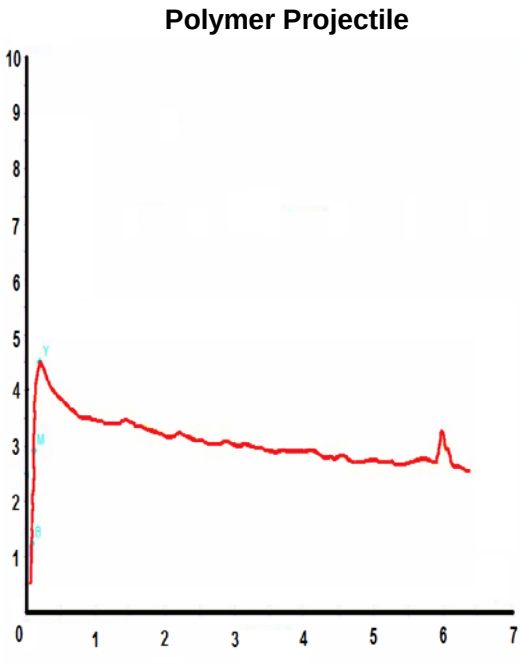
Static vs. Dynamic Pressure

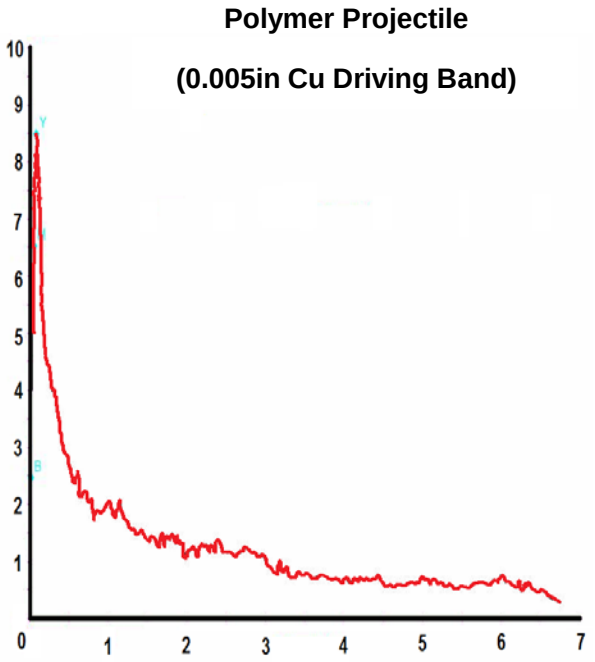
$$P_{total} = P_{static} + \frac{\rho U_{gas}^2}{2}$$

Projectile Design



Bullet Force Data from Model





Actual Force Data – MTS

16in SS Barrel – Worst Case

Ammunition Summary

ATK'S TECHNOLOGY BRINGS FORCE ON FORCE TRAINING TO THE NEXT LEVEL

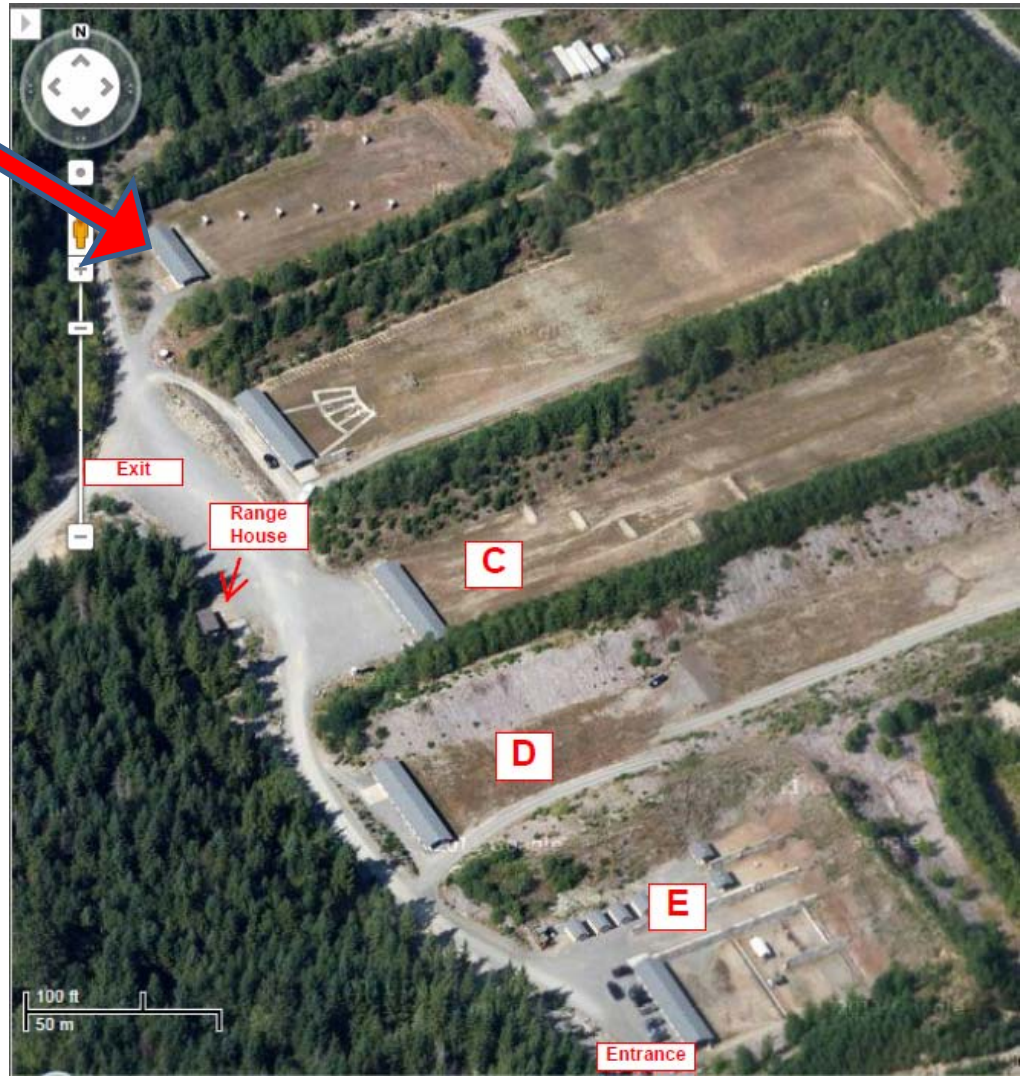
- ✓ LEAD FREE, SAFE FOR INDOOR USE
- ✓ EXTENDED SHELF LIFE
- ✓ NEGLIGABLE BARREL FOULING
- ✓ LOWEST STANDOFF DISTANCE REQURIED IN THE MARKET (1FT)
- ✓ MARKING MEDIA IS EASY TO CLEAN
- ✓ NON GUN POWDER (NO SMOKE AND NO SMELL)
- ✓ EXCEPTIONAL ACCURACY
- ✓ APPROPRIATE PAIN PENALTY
- ✓ FLAWLESS LOADABILITY
- ✓ COPPER DRIVING BAND DESIGNED TO ENGAGE RIFLING
- ✓ CONSISTENT RESULTS IN ALL BARREL LENGTHS

Force on Force System

1) Protection Clothing and Gear
2) Conversion Carrier Bolts
3) Ranges & Other Tools
4) Training

Questions

NDIA Firepower Demonstration



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