

# **GENERAL DYNAMICS**

Ordnance and Tactical Systems

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**43<sup>rd</sup> Annual Gun & Missile System Conference**

**Presentation by: Donald E. Dillard, P.E.**

**Title: S40mm x 180mm Common Case Design Progress**

**Time & Date: 1135 – 1155 Tuesday April 22, 2008**

**Approved for Public Release**

# 30/40mm Comparison ALACV Super 40mm

Cartridge OAL = 289.97mm

PGU 13

ALACV Design

W/2 Case Lengths



# S40mm ALACV with Steel Cases



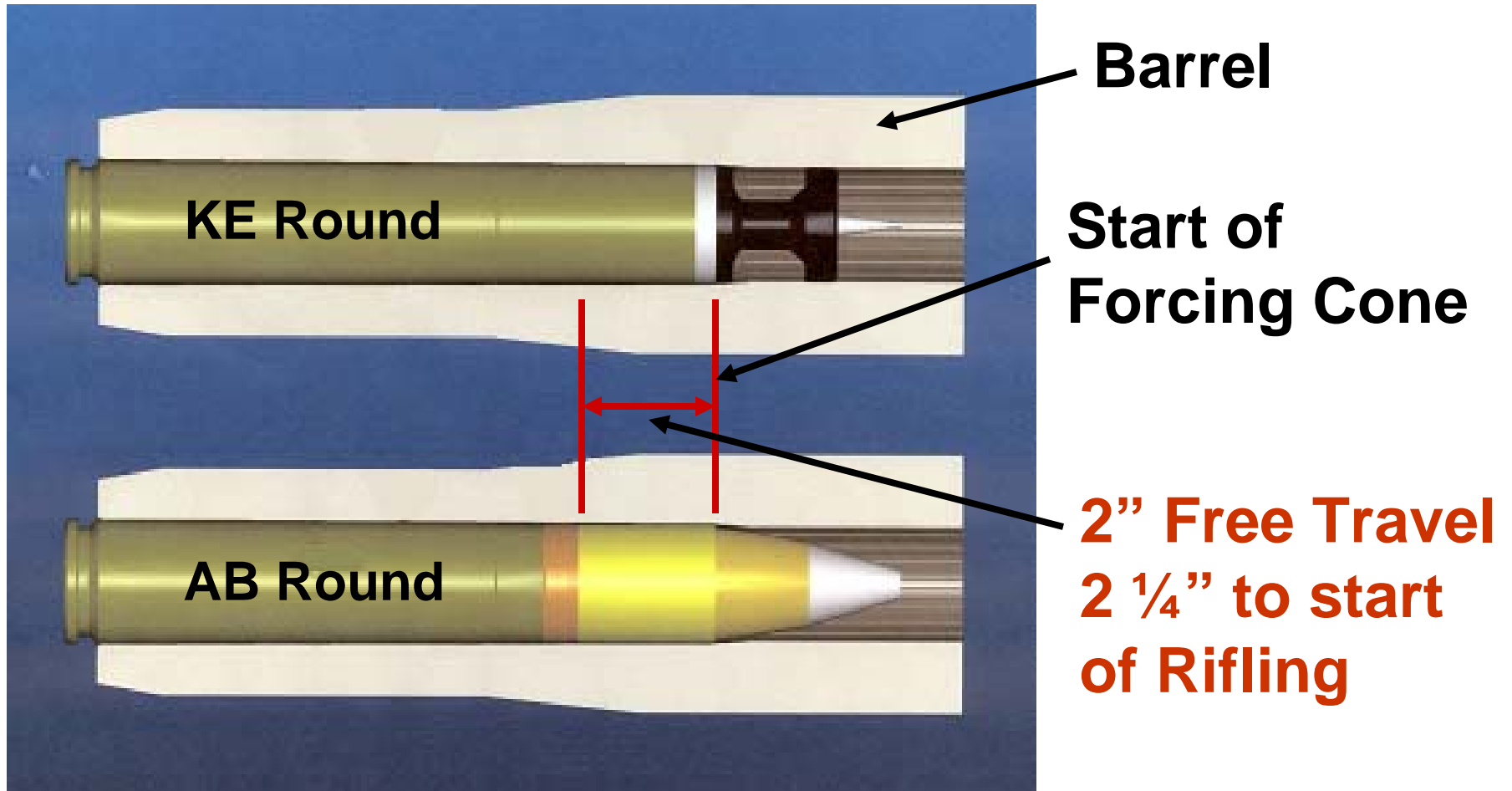
**KE with 218mm OAL Case**



**TP-T & AB with 165 OAL Case**

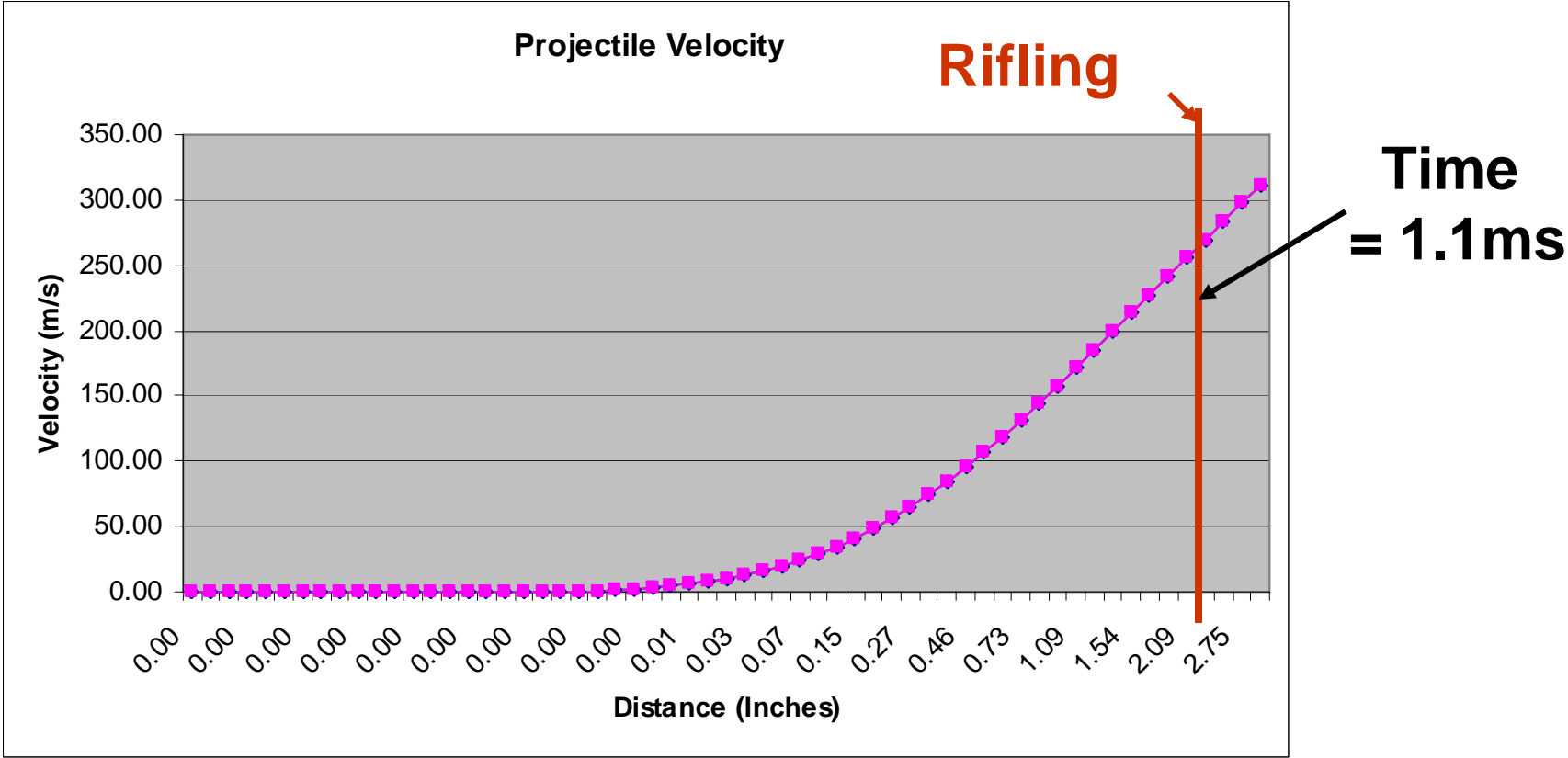
- **The Selected Case Lengths Provide Optimum Performance For Each Round**
- **Case Taper is only .009 in/in – Extraction issue?**

# S40mm ALACV Demonstration Rounds



**Free Travel Results in Excess Barrel Wear**

# S40mm ALACV – Velocity vs. Travel



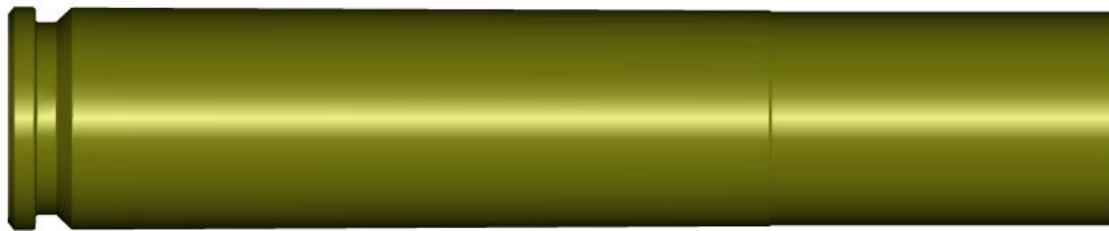
**Velocity at beginning of Rifling is >260 m/s**

# **S40mm Design Improvement**

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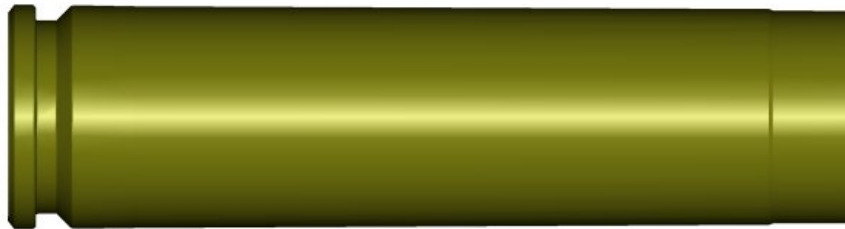
- **Common Case Length is a Necessity to Provide Long Barrel Life**
- **Increased Case Taper is Desirable**
- **Parametric Study Undertaken to Establish Optimum Length**
- **Case Lengths Evaluated from 165mm to 215mm**
- **180mm Selected – Provides Acceptable Taper and Area for AB Fuze Communication**

# S40mm Case Comparisons



ALACV Cases - 165mm & 218mm

40mm



39mm for  
Add'l Case  
Taper

GD-OTS S40mm x 180mm

# S40mm Common Case



- 1. Steel Case for Robustness**
- 2. Threaded Primer Insert Allows Propellant Fill from Rear If Necessary**
- 3. Uses Standard M36 30mm Primer and Flashtube**
- 4. Taper Increased From .009 to .0166 in/in**



# S40mm With Common Case



1. Forward Edge of Driving Bands Are At Forcing Cone
2. AB Has Adequate Area for Communication & Bearing Surface
3. Both Rounds use St. Marks Powder Hybrid Propellant – High Performance & Low Barrel Erosion

# Why S40mm?

## 30mm x 173 Shown Superimposed over S40mm



1. **Compatible With Highly Reliable ATK MK44 30/S40mm Chain Gun**
2. **Same Link and Stowage Space as 30mm**
3. **Increased Payload & Lethality**
4. **Modest Cost Increase Over Tactical 30mm Rounds**
5. **S40mm ALACV Demonstrated @ High Rate Burst in the MK44 Weapon**

# Why S40mm APFSDS-T?

## Penetrator Comparisons



25mm M919

30mm

S40mm

1. Muzzle Velocity Approx. Same as 25/30mm
2. S40mm Provides ~ 20% to 25% Penetration Increase over 30mm

# Why S40mm HEAB-T?



**30mm**



**S40mm**

- 1. Muzzle Velocity Equal or Greater Than 30mm With Pressures Near 400 MPa**
- 2. Approx. 60% More Payload Delivered to Target**

# **S40mm Summary**

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- **S40mm Lethality is Greater Than 30mm**
- **High Vehicle Stowed Load Capacity**
- **Modest Cost Increase Over 30mm**
- **MK44 30/S40mm Chain Gun Uses a Highly Reliable and Proven Design**
- **S40mm Common Cases Available in July 08**

# S40mm Common Case Design Progress

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## Questions