



Reduced Range Training Ammo

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UNPARALLELED
**COMMITMENT
& SOLUTIONS**

Act like someone's life depends on what we do.

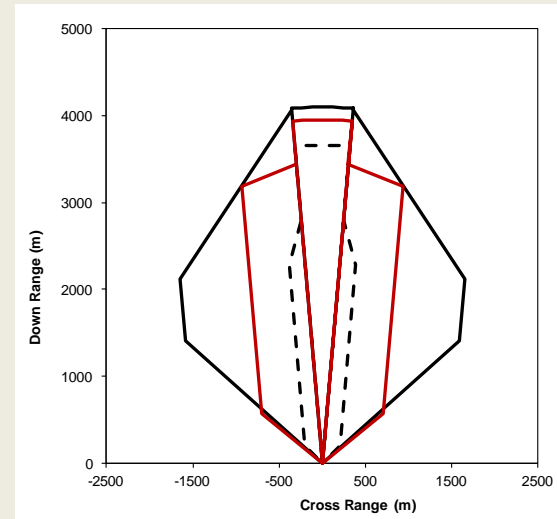


U.S. ARMY ARMAMENT
RESEARCH, DEVELOPMENT
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- Need to reduce the overall Surface Danger Zone on current ranges
 - Starting with 7.62mm
- Gap exists between current combat ammo and short range training ammo
 - Trying to reduce overall range but still allow for qualification and collective fire exercises
- Objective goal of 900 meter range with 2400 meter threshold



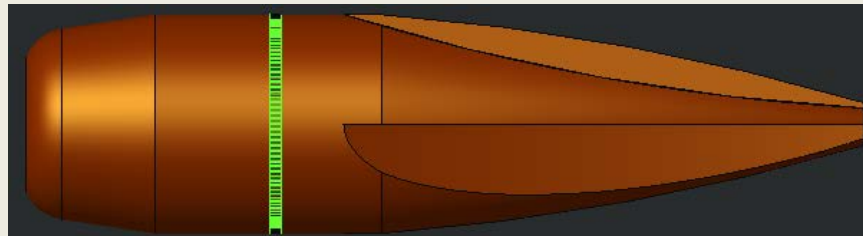
- Current Short Range Training Ammo – SRTA
 - Match out 100m within 1mil
 - 600 meter max range
 - Can't be used for qualification
- Current program aims to allow for qualification testing and collective fire exercises while offering a significant reduction in SDZ.





- 900m max range objective, 2400m threshold
- Match trajectory of M80A1 out to 800 meters
- Comparable cost to current combat ammo
- Similar accuracy to M80A1
- No modification to weapon system
- No lead
- Less damage to range targets than combat ammo
- Range reducing feature is 100% reliable

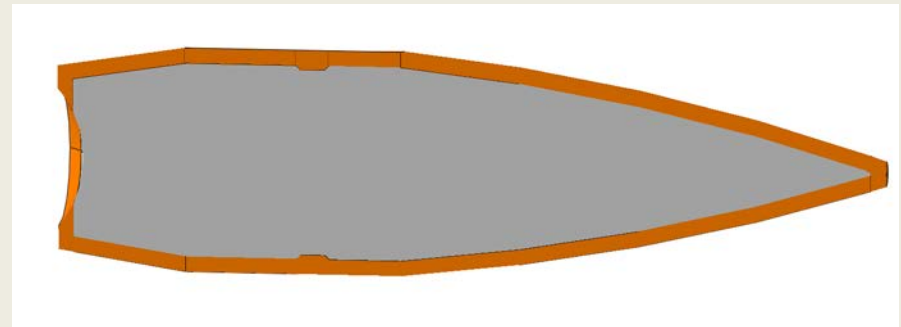
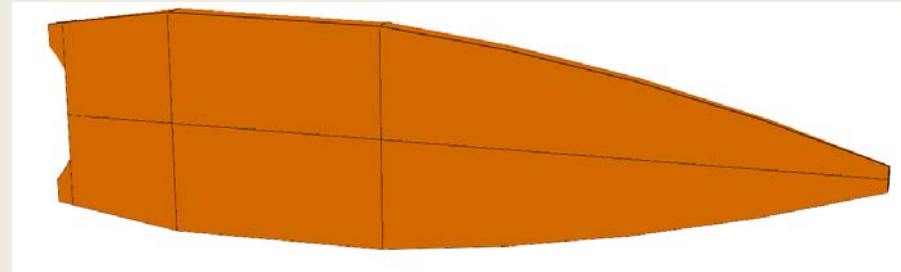
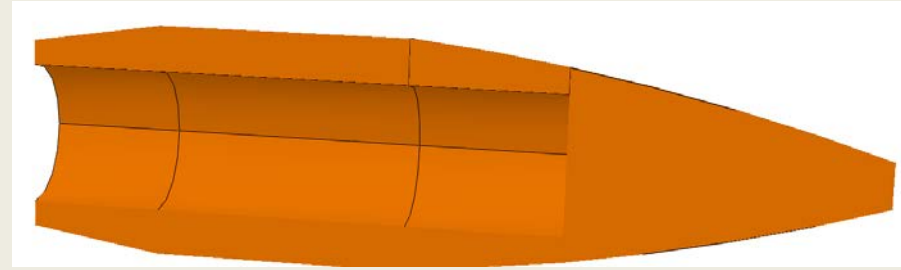
- Designed for Coast Guard – original design concept 2007, actual L2R2 design started 2010
- Accuracy and soft target effectiveness requirements out to 400 meters
- Multiple materials selected for corrosion resistance
- Had to work in conventional weapon systems
- Design based on M80 combat ammo
- Cuts on ogive create roll dampening effect leading to dynamic instability





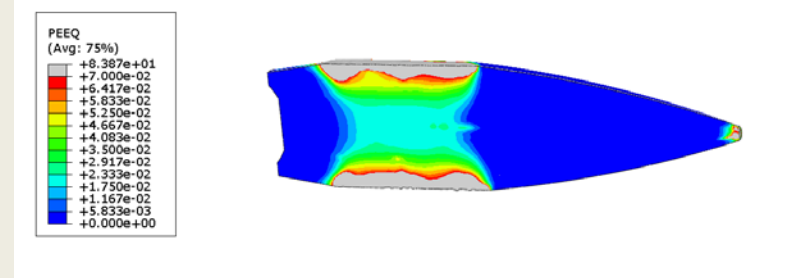
- Radar and dispersion testing completed.
- Multiple Drag curves identified
 - Drag curves not consistent round to round as with standard ball ammo
 - Differing drag regimes round to round
- Failure investigation ongoing

- Current design path is investigating projectile weight and velocity manipulation to achieve objectives
- Modeling and Simulation suggests that the threshold requirements can be met by these changes
- The design team is also evaluating several in-expensive lightweight metals such as zinc or aluminum for core materials

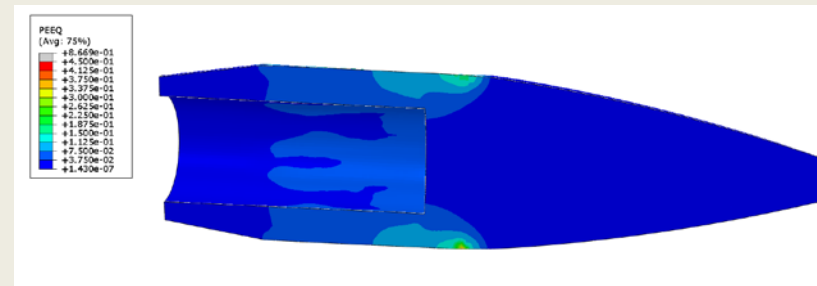


- Using Finite Element Analysis the proposed materials were evaluated for structural integrity during launch
- Zinc showed high plastic strain in engraving area relative to % elongation
- Copper showed failure at certain drill depth – switched to drilled zinc to achieve weight requirements

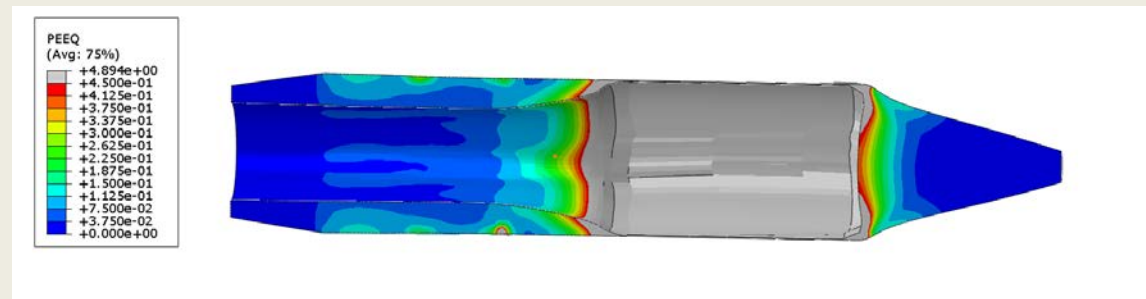
Zinc



Copper – Drilled to 105 grains



Copper – Drilled to 90 grains

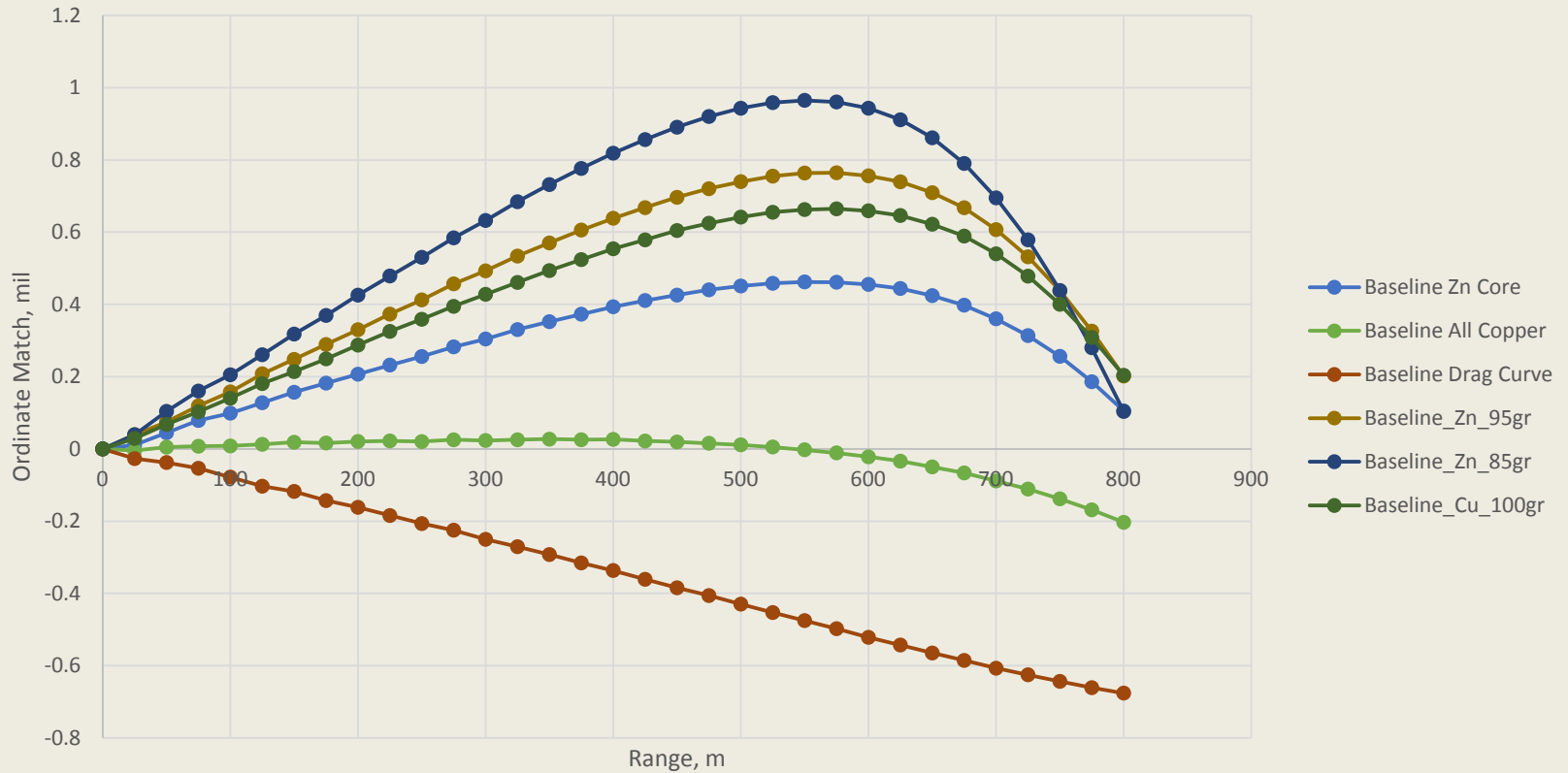




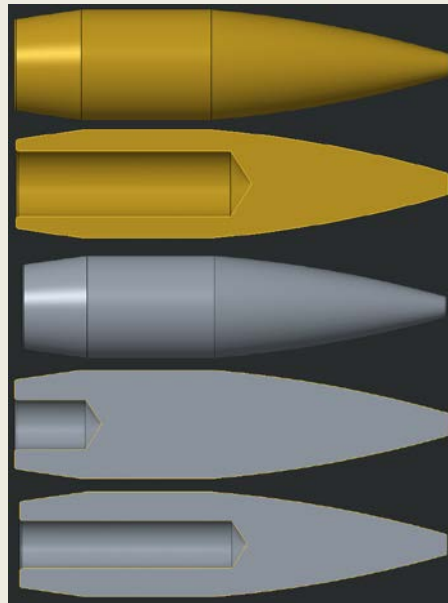
Projectile	max range	MV	Mass	Stability Factor
	(m)	(ft/s)	(grains)	
Baseline legacy	3278	2815	147	2.2
Baseline All Copper	2986	3019	128	2.1
Baseline Zn Core	2661	3280	108	1.9
Baseline Al Core	1950	3800	70	1.8
Baseline all Zn	2543	3394	101	1.7
Baseline Zn -95r	2445	3494	95	1.9
Baseline Zn -85r	2266	3689	86	1.8
Baseline Cu-100gr	2528	3413	100	3.1
M80A1 Baseline	>3500	>2800	131	1.62



M80A1 Ordinate Match with All DesignCandidates

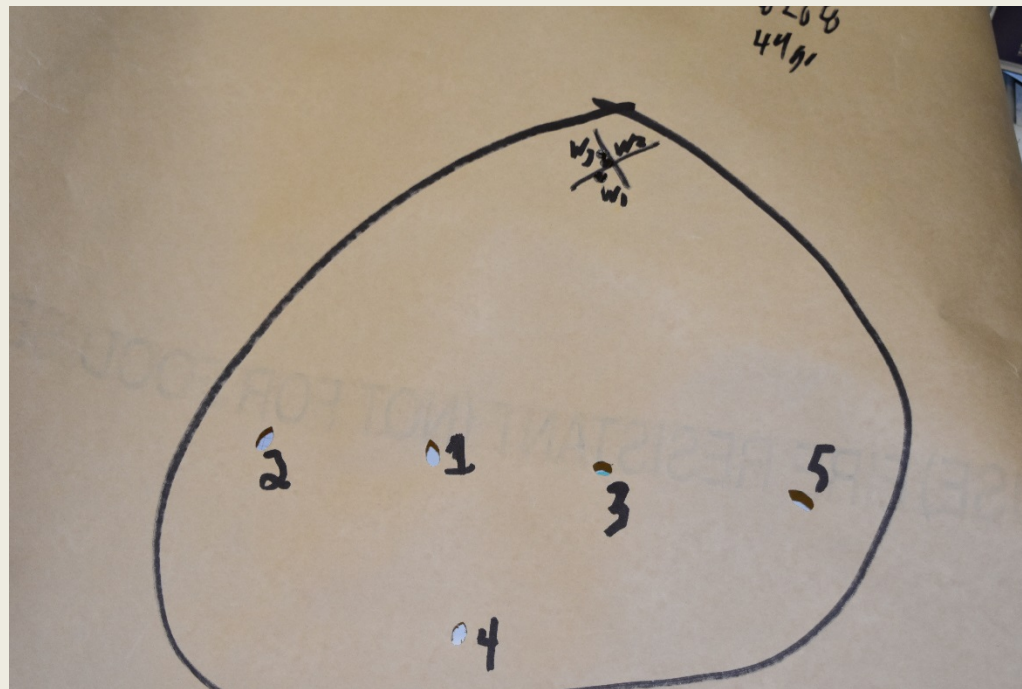


- Based on initial modeling and simulation data several different projectile weights were established.
- For prototype rounds we drilled out the centers to achieve our weight requirements
- Due to the density of Copper several light weight concepts were switched to Zinc to preserve structural integrity.

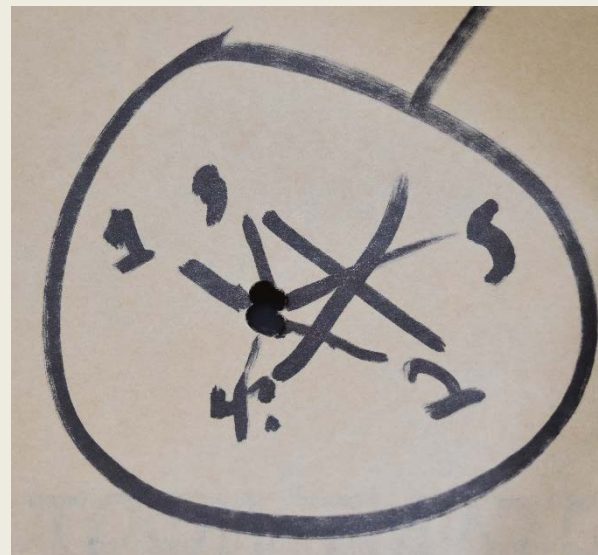
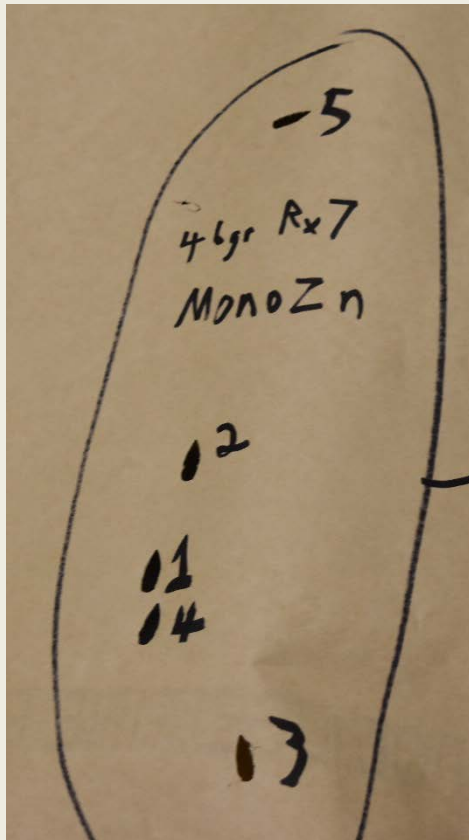


- 130gr monolithic copper
- 100gr drilled copper
- 102gr monolithic zinc
- 95gr drilled zinc
- 85gr drilled zinc

- Charge Weight Establishment testing conducted on the five initial prototypes
- Zinc rounds experienced large amount of yaw



- Copper rounds compared to Zinc





- Radar testing completed during week of 4/10
 - Radar testing will allow for the down selection of an optimal weight
- Several other concepts currently being tested
- Complete failure investigation of the L2R2 round
- For TRL level 5
 - Max Range (Radar Testing)
 - Dispersion
 - Point of Aim/Point of Impact
- Transition to PM-MAS 1st QTR FY19

