Reduced Range Training Ammo

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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
### Modeling and Simulation – Exterior Ballistics

<table>
<thead>
<tr>
<th>Projectile</th>
<th>max range (m)</th>
<th>MV (ft/s)</th>
<th>Mass (grains)</th>
<th>Stability Factor</th>
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<tbody>
<tr>
<td>Baseline legacy</td>
<td>3278</td>
<td>2815</td>
<td>147</td>
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<tr>
<td>Baseline All Copper</td>
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<td>Baseline Zn Core</td>
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<td>3280</td>
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<td>Baseline Cu-100gr</td>
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<tr>
<td>M80A1 Baseline</td>
<td>&gt;3500</td>
<td>&gt;2800</td>
<td>131</td>
<td>1.62</td>
</tr>
</tbody>
</table>
M80A1 Ordinate Match with All Design Candidates

- Baseline Zn Core
- Baseline All Copper
- Baseline Drag Curve
- Baseline_Zn_95gr
- Baseline_Zn_85gr
- Baseline_Cu_100gr
• 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