Facility Infrastructure Study for Caseless Ammunition

NDIA Small Arms Conference
24 MAY 2011

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Acknowledgement

Work supported by
JSSAP, Picatinny Arsenal, New Jersey
through
Army Research Office – Scientific Services Program (ARO/SSP)
under
USG contract W911NF-07-D-0001
Project Scope

- Develop Rough Order of Magnitude (ROM) cost estimate for Caseless (CL) ammunition production
- CL has only two common components w/current (brass-cased) ammo: bullet & primer mixture
- Focus on new or unique infrastructure needed
  - Facilities
  - Equipment
- Consider two production rates:
  - 400 million rounds per year (sustainment)
  - 1 billion rounds per year (surge)
- Production concept not detailed – only defined sufficient to support ROM estimate
Caseless Ammunition Technology

Key Technologies
- Telescoped configuration
- High Ignition Temperature Propellant (HITP)
- Internal Primer assisted interior ballistics
- 50% wt Reduction
- 40% volume reduction
CL Production Network Concept
Molding Concepts

Injection Molding
- Binder and propellant in separate feed lines
- Propellant and binder mixed during injection
- May employ de-airing manifold (high-speed, filling without air pockets)

Liquid Injection Molding
- Propellant mixed with binder precursors in separate pre-mixes
- Premixes in separate feed lines
- Premixes mixed prior to injection
- May employ de-airing manifold (high-speed, filling without air pockets)
Mold Assembly Concept

**Two-Piece Mandrels**
- Form entire internal cavity without pinch points
- Lower Mandrel used to eject Cartridge Bodies

**Injector Manifold**
- Static mixers paired to balance load on mandrels
- May employ de-airing manifold (high-speed, filling without air pockets)

**Link Groove Inserts**
- Form Link Groove without pinch points
- Automatic engage/disengage via pins in top plate
Molding Line Concept

**Maintenance Swap**
- Molds flagged for maintenance are swapped out with spares to avoid downtime; serviced off-line

**Injection Machine**
- Propellant mix injected into mold
- Slight pressure applied ensures complete fill

**Pressure Inspection**
- Manifold applies air pressure test for vent blockages
  - If blockage then mold flagged for maintenance

**Close & Latch**
- Mold lid from previous cycle placed on lower mold
- Pins on mold lid push Link Groove Inserts into place

**Cure**
- Propellant in mold for several fill cycles until cured enough for subsequent handling

**Spray Release**
- Mold release applied as required
  - Ensures clean separation of propellant from mold

**Unlatch & Lift**
- Mold top removed

**Visual Inspection**
- Machine vision inspection of mold
  - If evidence of residue mold flagged for maintenance

**Eject**
- Gripper plate lowered onto mold
  - Cartridges ejected
  - Gripper plate engages OD of Bodies
  - Cartridges transferred to remainder of production line

**Clean**
- Mold is cleaned to remove residual propellant pieces

**Spare Staging**
Summary

• Developed Rough Order of Magnitude (ROM) cost estimates for Caseless (CL) ammunition production for two production rates
  – 400 million rounds per year (sustainment)
  – 1 billion rounds per year (surge)

• Focused on new or unique infrastructure needed
  – Facilities
  – Equipment
  – Trained personnel

• Concepts for production tooling and a new kind of production line were defined to a level sufficient to support ROM estimate
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