Lightweight Small Caliber Ammunition

Lessons Learned from Prototype Fabrication to Full Production

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LSCA Programs

- Objective
- Partnership
- Concept
  - Concept Transfer
- Work Progress
- Manufacturing Process
- Manufacturing Challenges
- Risk Assessment
- Conclusion
Objective

To develop a functional alternatives for combat & training cartridges

- Offers a weight savings of 20%
- Meets current ballistic performance in unmodified weapon systems
- Manufactured using standard industrial techniques
- Assembled on conventional ammunition loading machinery
- Broadens the manufacturing base for military ammunition manufacturing
- Cartridge case produced and loaded at normal production rates
Partnership

- **Fleximation** – Thin Wall Steel Concept
- **ARDEC** – Metallurgical Expertise & Computer Modeling and Simulation Capability
- **GD-OTS Canada** – Expertise in Ammunition Design & Production
  - NATO test facility
- **US Stamping Industry** – Expertise in Commercial Metal Stamping Processes
Concept – 7.62mm Ball

- Accomplished by thinwall steel replacing current brass case
  - Reproduces brass spring back
  - Capable of supporting ballistic pressure without splitting

- Aluminum plug is used in the base to provide structural support
  - Properties are suitable to accomplish component’s functional requirements

20% Weight Reduction
Work Progress

- Feasibility – Computer Modeling
- Phase 1 – Applied Research & Concept Demonstration (Ball and Tracer)
- Phase 2 – Development & Limited Production
- Phase 3 – Pilot Production For Government Testing
- Develop other calibers / configurations
  - 5.56mm and 7.62mm
  - Blank and Tracer Ammunition
Cartridge Manufacturing Process

- Multi-Station Transfer Press
- Final Case Assembly
- Stress Relief
- Wash Dry
- Primer Insert
- Load Assemble
- Link Package
- Primer Lacquer MWC
- Propellant Bullet Mouth Crimp

Outer Shell
- Uniform Thickness
- Stainless Steel Strip

BASE PLUG
- Aluminum Rod

Stress Relief
- Primer Insert
- Load Assemble
- Link Package
Manufacturing Challenges

(P) Failure Mode & Effects Analysis

Manufacturing Challenges

- Raw Material Variations
- Tool Wear
- Trimmer Wear
- Tooling Break-In
- Cleaning Process
- Cold Heading Aluminum Plug
- Meeting DDI Requirement
- Inspection & Manufacturing Controls
Risk Assessment

Risk Analysis

- Ensure that the product and the process are safe
  - EPVAT
  - Primer Sensitivity
  - Overpressure Test
  - Case Burst Effects

**Pressure vs ACW**

**Velocity vs ACW**
Conclusion

Accomplishments

- Weight reduction objective met
- Demonstrated F&C with M240 Machinegun in Ball, Tracer & Blank configurations
- Ballistic performance complies with MIL Specs
- Compatible with standard cartridge components
- Compatible with conventional loading equipment
- Form, fit and function similar to brass-cased ammunition
- Material cost advantage over brass alloy
- Simplified manufacturing process steps
**Further Information**

**GENERAL DYNAMICS**  
Ordnance and Tactical Systems–Canada

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