National Defense Industrial Association Small Arms Symposium

Lightweight Small Caliber Ammunition

Lessons Learned from Prototype Fabrication to Full Production

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GENERAL DYNAMICS
Ordnance and Tactical Systems–Canada

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

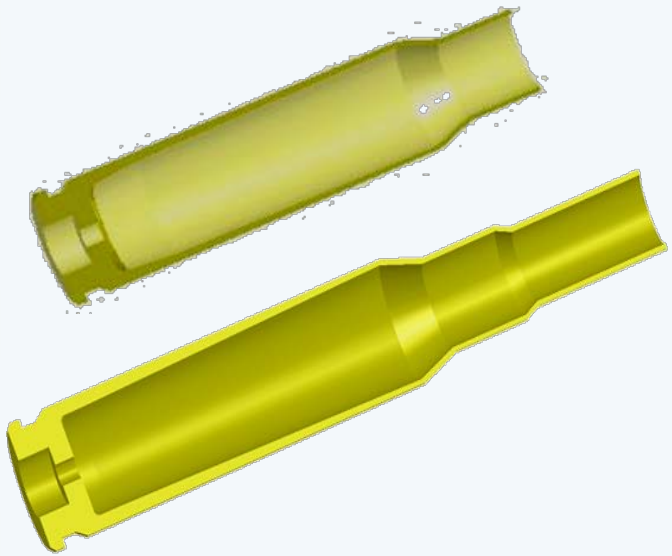
Partnership

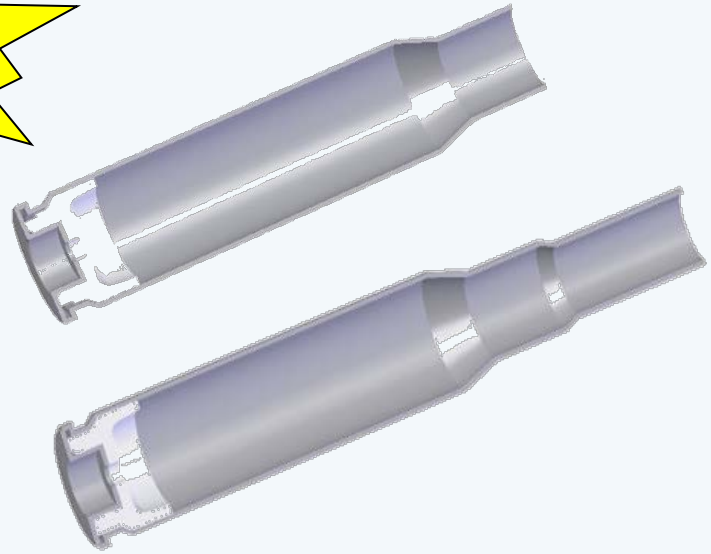
- **Fleximation** – Thin Wall Steel Concept
- **ARDEC** – Metallurgical Expertise & Computer Modeling and Simulation Capability

- **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

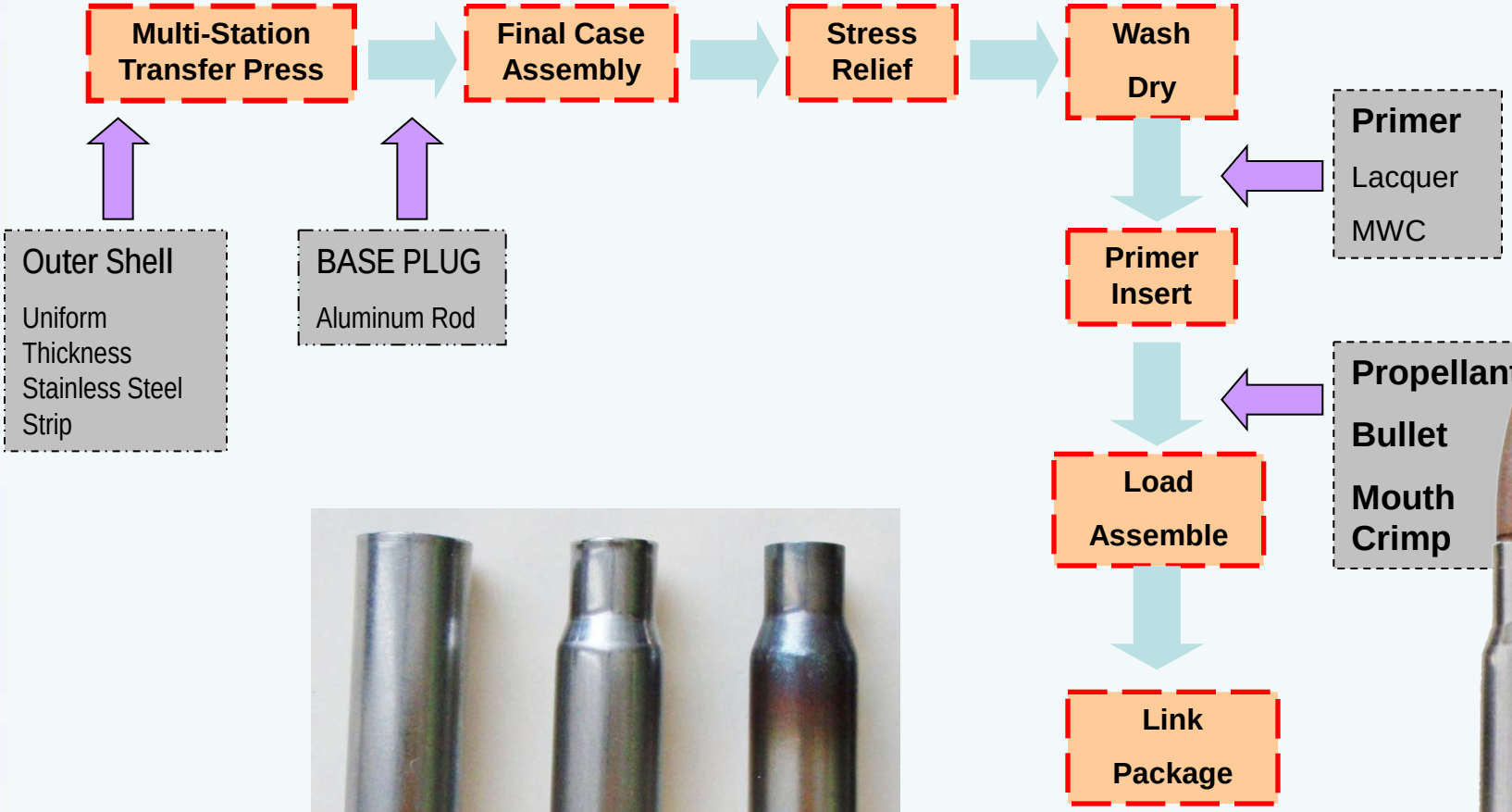




Work Progress

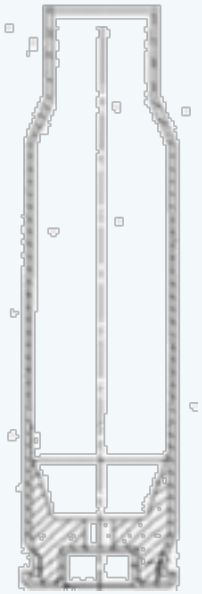
- Feasibility – Computer Modeling
- Phase 1 – Applied Research & Concept Demonstration (Ball and Tracer)
- Phase 2 – Development & Limited Production
- **Phase 3 – Pilot Production For Government Testing**
- **Develop other calibers / configurations**
  - 5.56mm and 7.62mm
  - Blank and Tracer Ammunition

Cartridge Manufacturing Process



Manufacturing Challenges

(P) Failure Mode & Effects Analysis

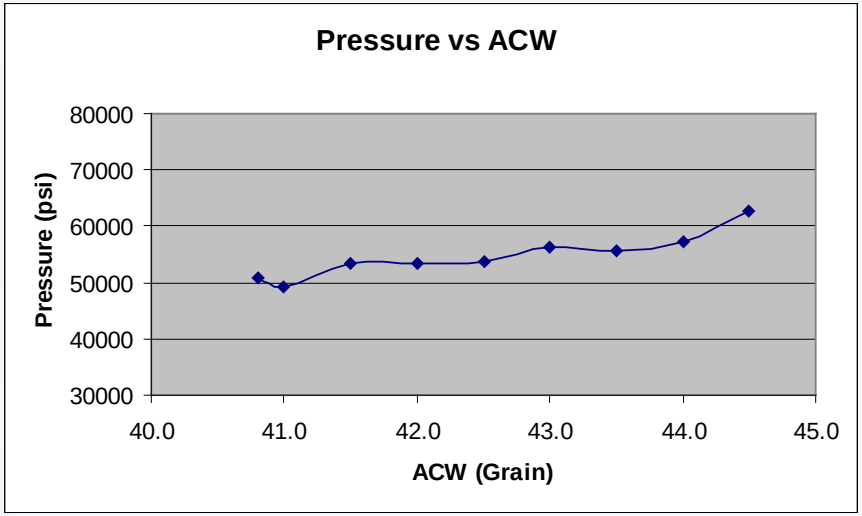


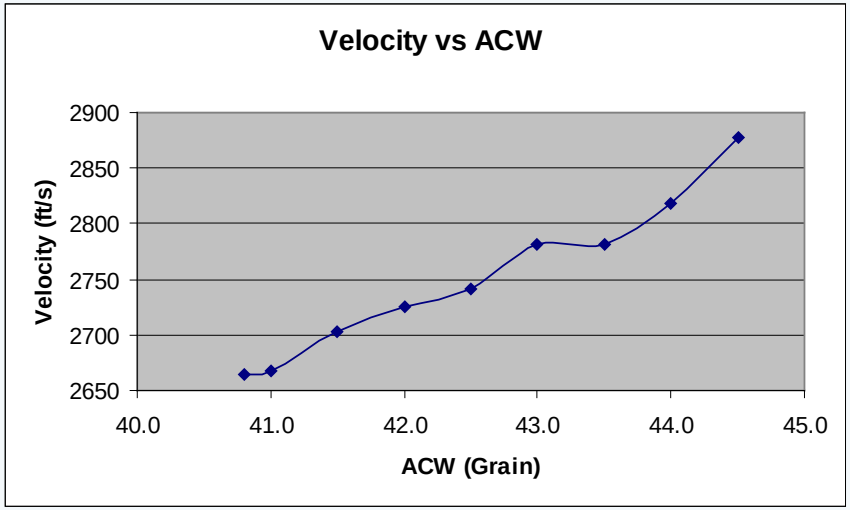
- **Manufacturing Challenges**
  - Raw Material Variations
  - Tool Wear
  - Trimmer Wear
  - Tooling Break-In
  - Cleaning Process
  - Cold Heading Aluminum Plug
  - Meeting DDI Requirement
  - Inspection & Manufacturing Controls

Risk Assessment

Risk Analysis

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





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

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Ordnance and Tactical Systems–Canada

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