40mm Reliability Trends in the System Contract

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AMTEC CORPORATION
a National Defense Corp Company

Premise

Diversified Products for the National Defense

The high reliability of the US Army's ARDEC designed 40mm fuzes and tactical cartridges has been demonstrated through 10 years of two Systems Contracts.

Photo: US Army

From Break-out to System Contract

In 2005, the US Army awarded the largest ever Small Business Set-Aside System Contract. The new Prime Contractor assumed responsibility for overall 40mm cartridge reliability results.

Bottom Line Up Front

- Implementation of System Management Contract has confirmed 40mm System Capability and Warfighter Utility

Bottom Line Up Front

- Performance – Repeatability and Reliability Exceeding Requirements

- Availability – Production Rate and Schedule Meets US Army Needs

Two Types of Reliability:

Functional

High Order Main Charge Detonation

Safety

It detonates when it supposed to, safe to handle, and compliant to MIL-STD-1316

M433 HEDP 40mm Cartridge

The Specification Reliability Requirement[1]:

M433 HEDP Low Velocity - .958

AMTEC Reliability[2] - .993

[1] MIL-DTL-50872

[2] 114 LATs over 9 years representing **2.9** Million units

M433 HEDP LAT Results

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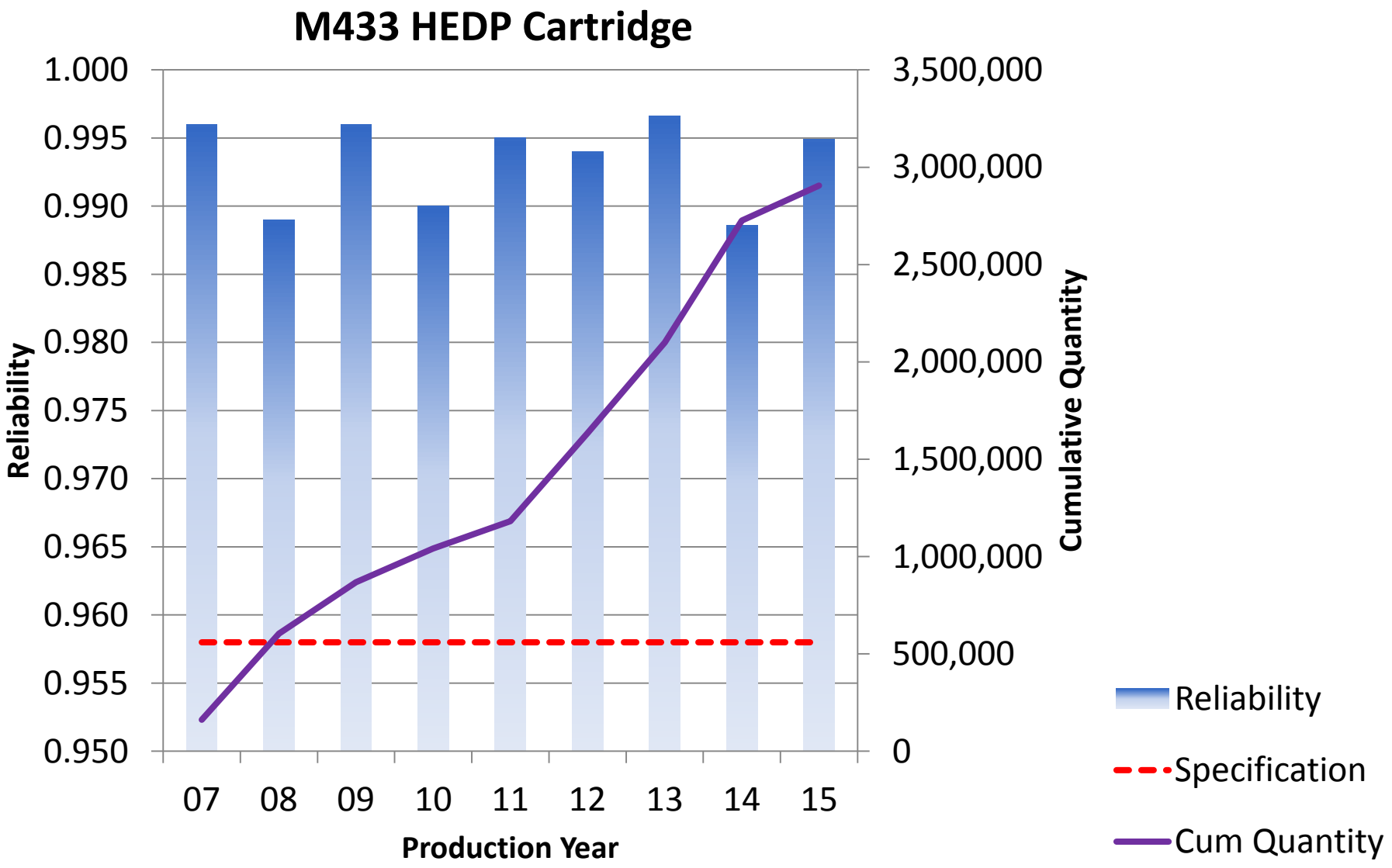

M430A1 HEDP 40mm Cartridge

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The Specification Reliability Requirement[1]:

M430A1 HEDP High Velocity - .968

AMTEC Reliability[2] - .995

[1] MIL-DTL-50863

[2] 307 LATs over 10 years representing 14.7 Million units

M430A1 HEDP LAT Results

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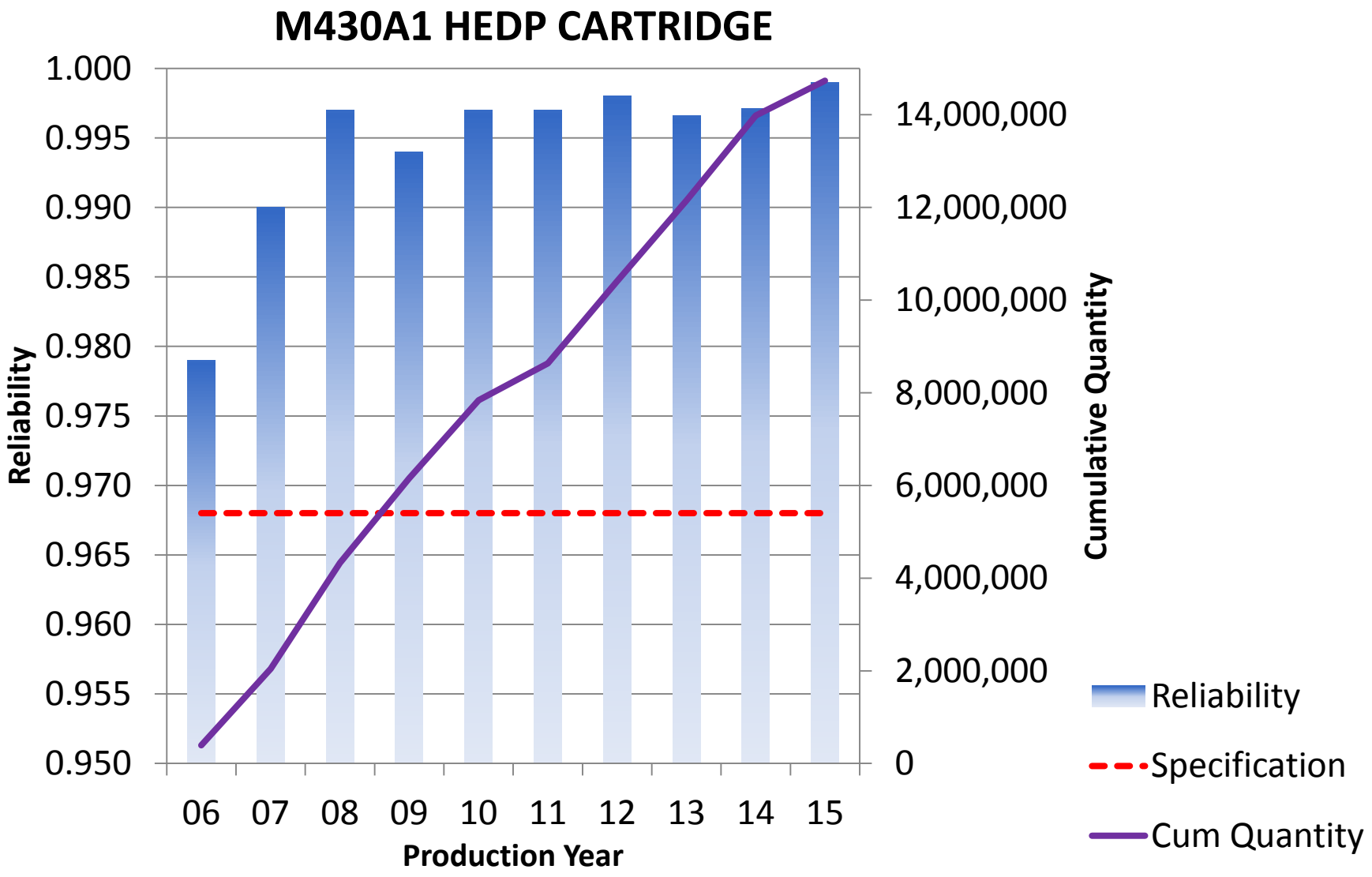

The Specification Reliability Requirement[1]:

M550 PIBD Fuze Low Velocity - .962

AMTEC Reliability[2] - .999

[1] MIL-DTL-50869

[2] 68 LATs over 9 years representing
3.9 Million units

M550 Fuze LAT Results

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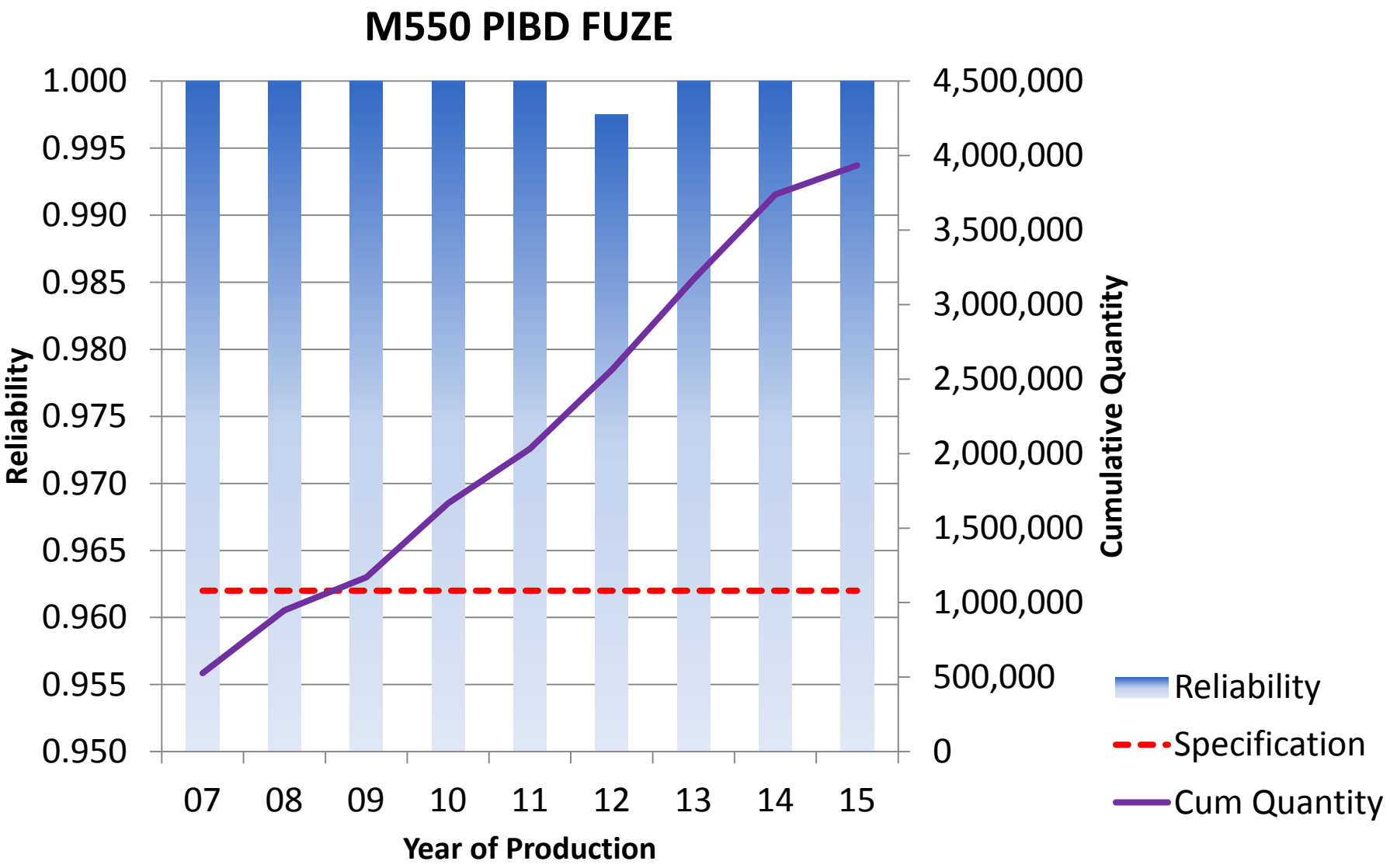

The Specification Reliability Requirement[1]: M549A1 PIBD Fuze High Velocity - .968

AMTEC Reliability[2] - .998

[1] MIL-DTL-32175

[2] 104 LATs over 9 years representing
13.2 Million units

M549A1 Fuze LAT Results

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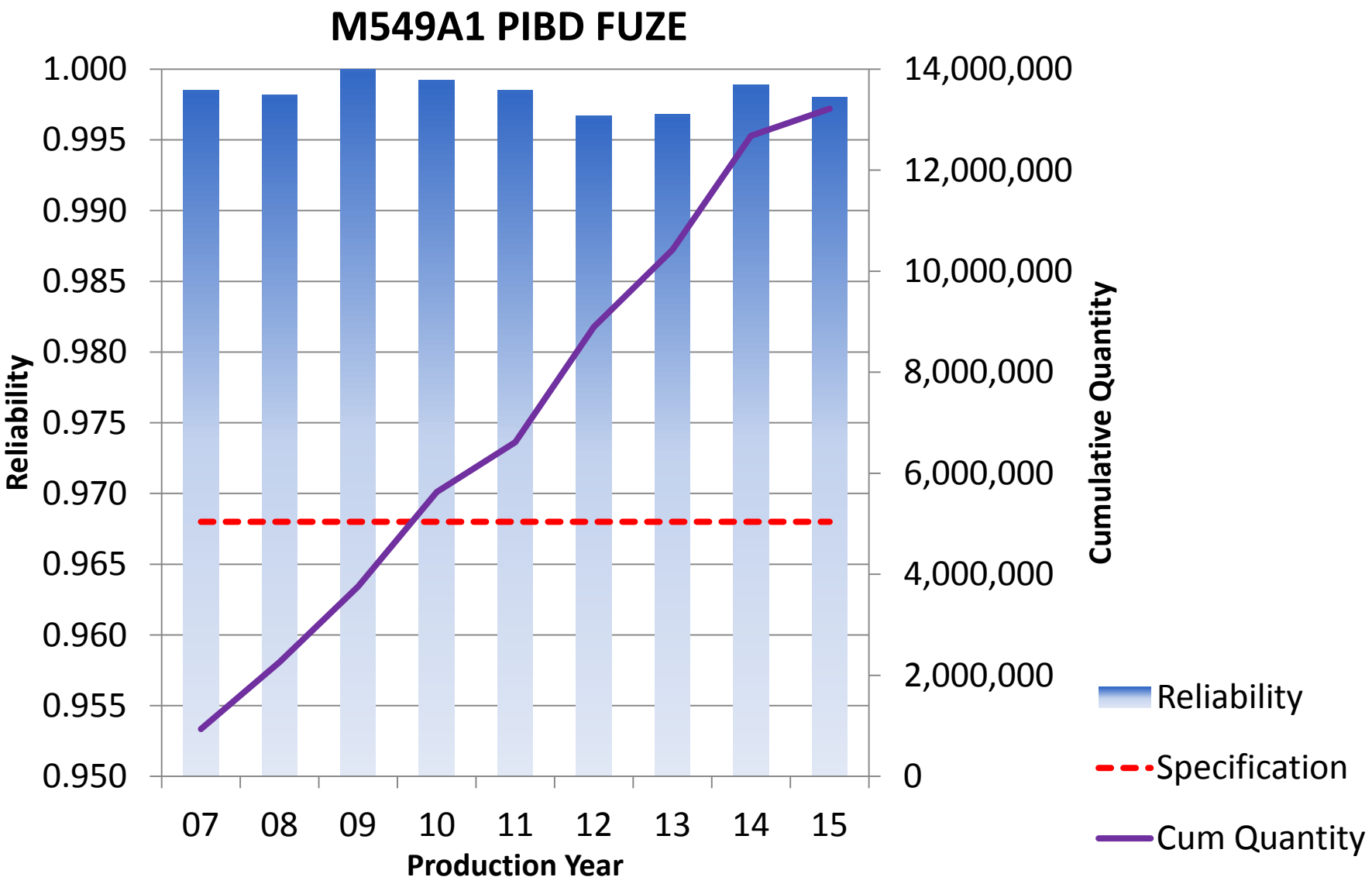

Reliability Contributors

Contributors to High Reliability:

- 10+ years of Contractor “Lessons Learned“
- Increased Automation
- Robust Inspection Criteria
- Variability Reduction

Contractor “Lessons Learned“

- Process Improvements have occurred at all levels from component manufacturing to Cartridge LAP
- Inspection and Sampling
- Integrated Product Team (IPT)
- Engineering Change Proposals (ECP)

Contractor “Lessons Learned“

- Fuze Modeling Addressed Stack-up Tolerance Issues
- Capitalization Improvements in Assembly Equipment Capabilities

Reliability Contributors

Increased Use of Automation

- Sensors
- Auto Recognition cameras
- Digital X-Ray
- Robots
- Networking

Inspection Criteria

- Critical Characteristics Control Plans
- Automatic Acceptance Inspection Equipment (AAIE)

Variability Reduction

- The System Contractor and suppliers have imposed tighter tolerances than allowed in the TDP based on analysis of key characteristics that drive variability

- Charge Evaluation Charge Verification (CECV) & Automated Propellant Loading

Benefits Realized

Program:

- Repeatability and Reliability Demonstrated to exceed Requirements
- Subject Matter Expertise (SME's) Strengthened
- Production Continuity through Single Fuze Manufacturer
- Mature Supply Chain Management

Benefits Realized

Warfighter:

- Ammunition Available – Inventory Established
- Performance Repeatability
- Operational Safety
- Weapon Interface –Stoppage/Jam Risk Minimized
- **CONFIDENCE IN 40MM**

Conclusion

Under the current management teams of the U.S. Army Product Director for Medium Caliber Ammunition, ARDEC, and the System Prime Contractor, the fuze safety, arming, and functional reliability characteristics of the 40mm fuzes and their integration with the high explosive cartridges have been demonstrated to exceed the published military specification requirements.

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