NATO Small Arms Ammunition Interchangeability via Direct Evidence Testing

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NATO Sub-Group 1 Mission

- The mission of SG/1 is to accomplish and maintain battlefield interchangeability of NATO small and medium caliber ammunition (and ancillary items) through direct evidence testing at NATO Certified Test Centers

Sub-Group 1 Structure

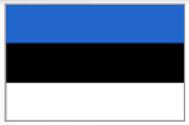

Austria


Belgium


Canada


Czech Republic


Denmark


Estonia


France


Germany


Greece


Hungary

Chairman Colonel Dirk Hemeryck (BELGIUM)

International Military Staff

Secretary SG/1 NATO Land Armaments


United States


United Kingdom

European Regional Test Center - ERTC (Pendine, Wales, UK)

ERTC Superintendent

26 Member National Delegates & Several PFP National Delegates

National Support Staff & Ammunition/ Weapon Manufacturers

North American Regional Test Center - NARTC (Independence, Missouri, USA)

NARTC Superintendent


Italy


Turkey


Iceland


Switzerland


Sweden


Spain


Slovenia


Slovakia


Romania


Norway


Netherlands


Lithuania

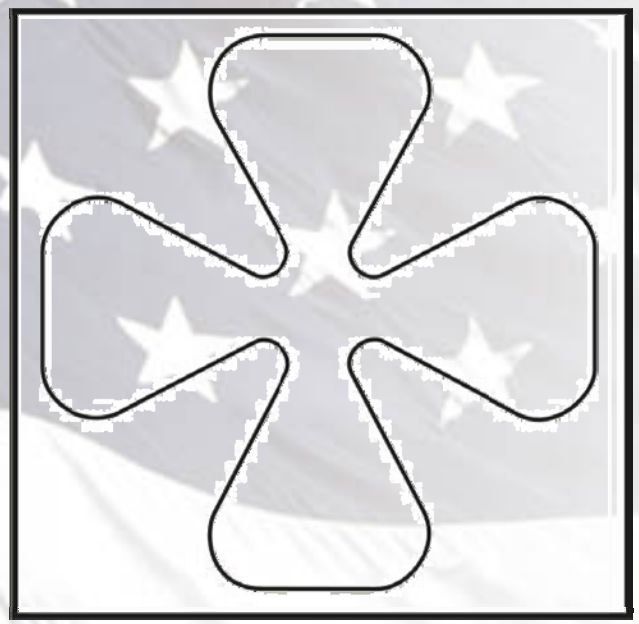
What is Interchangeability?

- **Interchangeability** – Items possessing similar functional and physical characteristics that are equal in performance, and capable of being exchanged one for the other without alteration
  - Interoperability – The ability of systems, units or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together
    - Compatibility – Capability of two or more items or components of equipment or material to exist or function in the same system or environment without mutual interference
      - Standardization - Within NATO, the process of developing concepts, doctrines, procedures, and designs to achieve and maintain the most effective levels of compatibility, interoperability, interchangeability and commonality in the fields of operations, administration and materiel

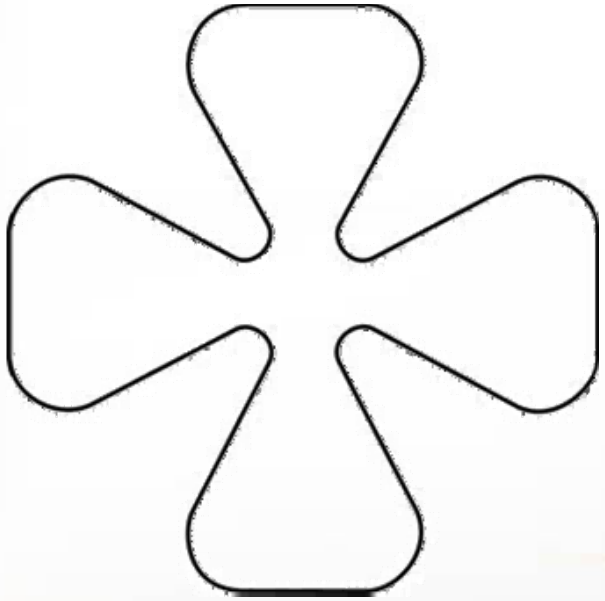
NATO Design Mark

The NATO Design Mark signifies that ammunition and ammunition in packages bearing this mark is manufactured to a design, which satisfies a NATO Standardization Agreement (STANAG)

NATO Symbols of Interchangeability



Cartridge & Link



Cartridge Only

The NATO Symbol of Interchangeability is the only symbol that denotes that the packaged ammunition is interchangeable

Accomplishing Battlefield Interchangeability

- Guidance from higher levels within NATO (NAAG, LCG/1)
- Develop technical requirements
- Develop test and inspection methods
- Conduct direct evidence testing to:
  - Qualify ammunition designs
  - Monitor designs in production
  - Check designs in storage
- Authorize the use of the NATO Symbol of Interchangeability
- Develop solutions to technical and procedural problems within the ammunition community

Battlefield Interchangeability Requirements

- Proper Weapon Function
- Safety of Gunner
- Adequate Terminal Effectiveness

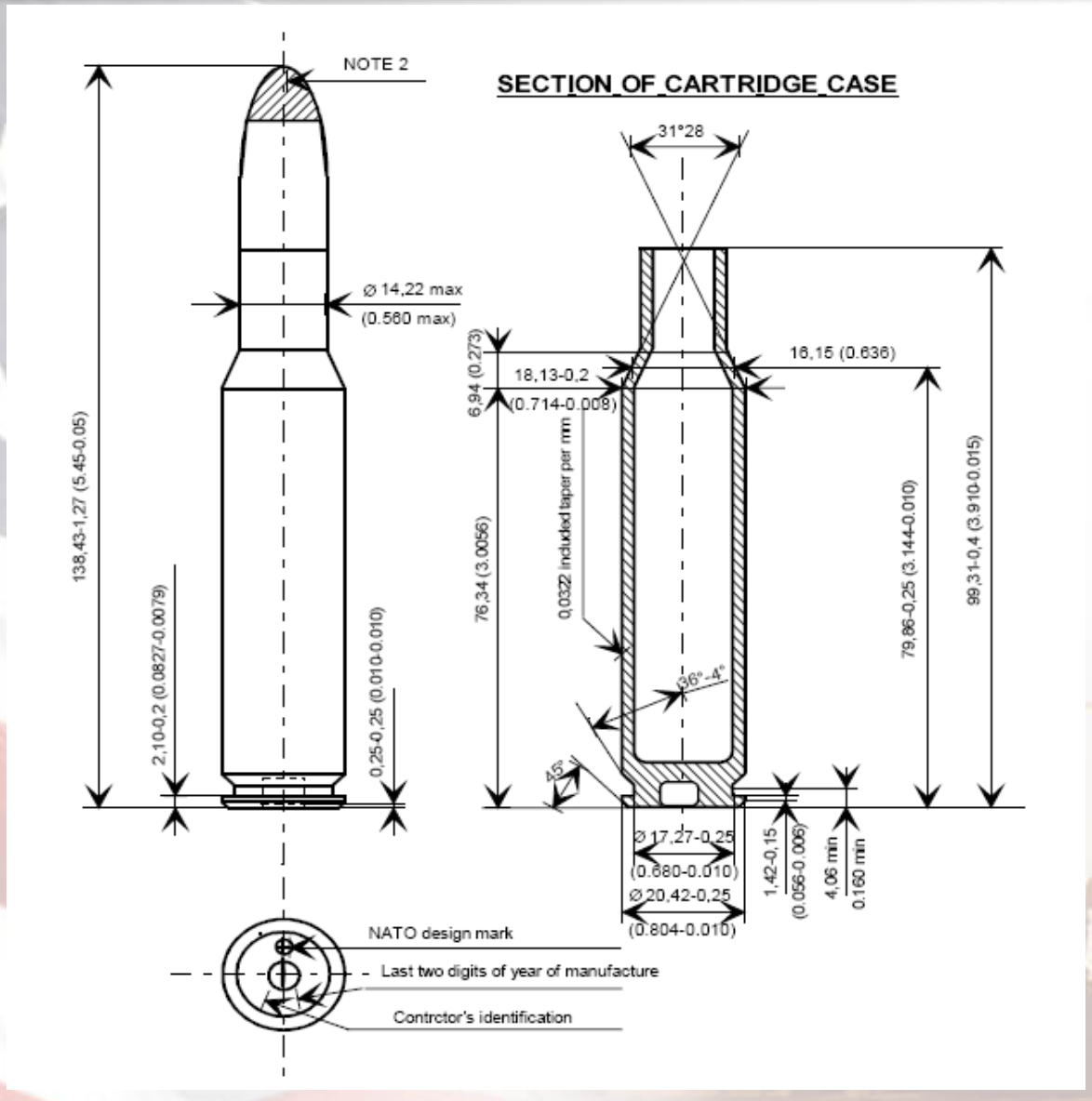
Without The Need For :

- Weapon Adjustments
- Sight or Fire Control Adjustments
- Range or Mission Limitations
- Ammunition Repack

NATO Standardization Agreement (STANAG)

- A STANAG is an agreement among several or all NATO nations to standardize, for the use of the NATO Armed Forces, the essential characteristics of various small and medium caliber linked ammunition types to ensure interchangeability on the battlefield
- Each STANAG contains performance requirements only, it does not address sample sizes or accept/reject criteria
- Each STANAG contains drawings outlining the exterior cartridge and case dimensions and characteristics
- STANAGs are NOT intended to be utilized for acquisition
- STANAGs are NOT intended to take the place of a national specification

Standardization Drawing



Manual Of Proof & Inspection (MOPI)

- There is an accompanying MOPI for each STANAG (caliber)
- The MOPI details the type of testing to be conducted to ensure that the ammunition meets the requirements of the appropriate STANAG
- The MOPI prescribes the uniform test methods, inspection procedures and equipment needed to perform the subject testing/inspection
- The MOPI includes sample sizes and accept/reject criteria for each test/inspection
- Sub-Group 1 is the only group within NATO to create and utilize these manuals to ensure functional interchangeability on the battlefield
- The NATO MOPIs are used throughout government/industry and have become THE standard for test procedures in the ammunition community

NATO Qualification Approval (QA)

- Conducted once for each ammunition design (and link if applicable) to confirm compliance with the STANAG & MOPI
- The submitting NATO nation shall have declared the ammunition design safe and suitable for use by their armed forces and have already procured or produced the ammunition
- A NATO design number identifies the qualified design and then the submitting NATO nation is granted authority to apply the NATO Symbol of Interchangeability to the outer pack of all ammunition
- It is NOT possible for manufacturers or non-NATO nations to submit ammunition for NATO QA testing

Application

NATO Production Test (PT)

- Conducted yearly to ensure that production of qualified designs continues to comply with the STANAG
- If a sample is not submitted, then current/future production cannot be marked with the NATO Symbol
- When more than one manufacturer produces the same qualified design, a sample from each manufacturer must be submitted for separate PTs
- SG/1 maintains an official list of qualified designs which also shows if the design is active (in production) or passive (no longer in production)
- Each NATO nation must complete a National Activity Report which demonstrates their level of activity
- It is NOT possible for manufacturers or non-NATO nations to independently submit ammunition for NATO Production Testing

NATO Production Test Failures

- Failure of the ammunition to meet the STANAG & MOPI requirements will result in the following:
  - Suspend the NATO qualified status of the ammunition produced since the last successful PT
  - Prohibit the use of the NATO Symbol of Interchangeability until a new sample has passed the PT
  - Remove the NATO Symbol of Interchangeability or constrain/ quarantine the affected ammunition from issue to any NATO multi-national forces
  - Present the results of the failed PT to SG/1 for a decision on the acceptability of previous production and use of the NATO Symbol of Interchangeability on following production
  - Submit a new PT sample when issue has been resolved/corrected

NATO Surveillance Test

- Conducted after specified storage intervals (10, 15, 20 years) to ensure that ammunition bearing the NATO Symbol of Interchangeability continues to meet NATO requirements

- Failure of the ammunition to meet the NATO requirements requires the NATO nation to remove the NATO Symbol of Interchangeability or constrain/quarantine the affected ammunition from issue to any NATO multi-national forces

How SG/1 Proves Interchangeability

- Interior Ballistics
  - Chamber & Port Pressure / Velocity / Action Time
- Exterior Ballistics
  - Precision / Trace / Trajectory Match / Penetration
- Manufacturing Quality
  - Waterproof / Bullet Extraction / Residual Stress
- Energetic Materials
  - Propellant & Primer Analysis / Primer Sensitivity
- Weapon Function

Tests Conducted For NATO Small Caliber Ammunition

QUALIFICATION	PRODUCTION	SURVEILLANCE
PRECISION	PRECISION	PRECISION
FUNCTION & CASUALTY	FUNCTION & CASUALTY	FUNCTION & CASUALTY
EPVAT	EPVAT	EPVAT
TRACE	TRACE	TRACE
BULLET EXTRACTION	BULLET EXTRACTION	
RESIDUAL STRESS	RESIDUAL STRESS	
PENETRATION	PENETRATION	
WATERPROOF	WATERPROOF	
SALT SPRAY/CORROSION	SALT SPRAY/CORROSION	
PRIMER SENSITIVITY	PRIMER SENSITIVITY	
TEMP (HIGH/LOW)	TEMP (HIGH/LOW)	
PROPELLANT AND PRIMER ANALYSIS	PROPELLANT AND PRIMER ANALYSIS	
BARREL EROSION		
TRAJECTORY MATCH		
CLIMATIC STORAGE		

NATO Regional Test Centers

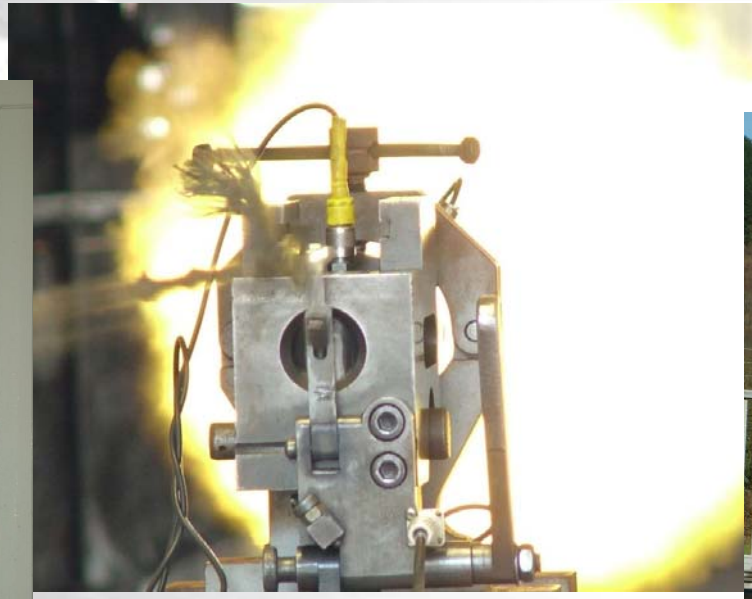
North American Regional Test Center (NARTC)

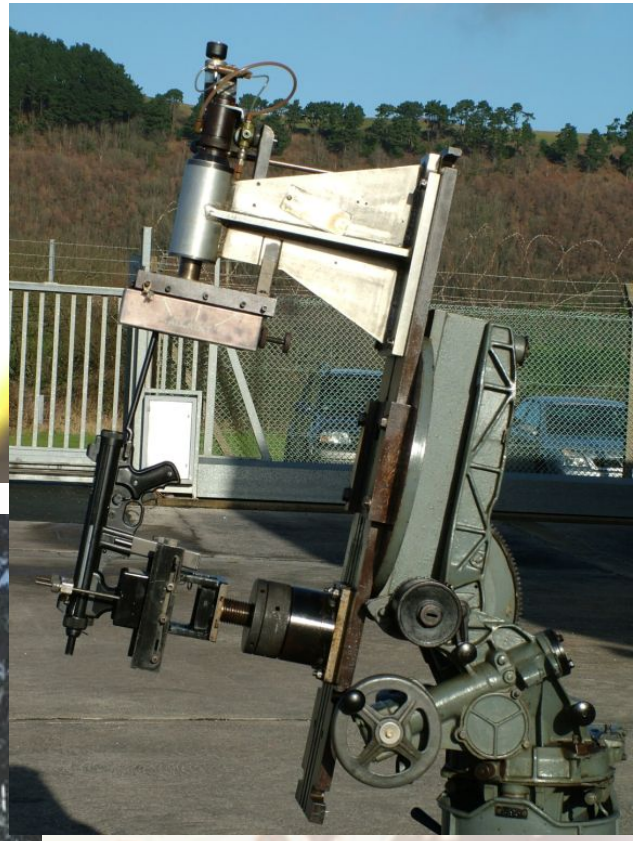
(Co-located at the Lake City Army Ammunition Plant, Independence, Missouri, USA)

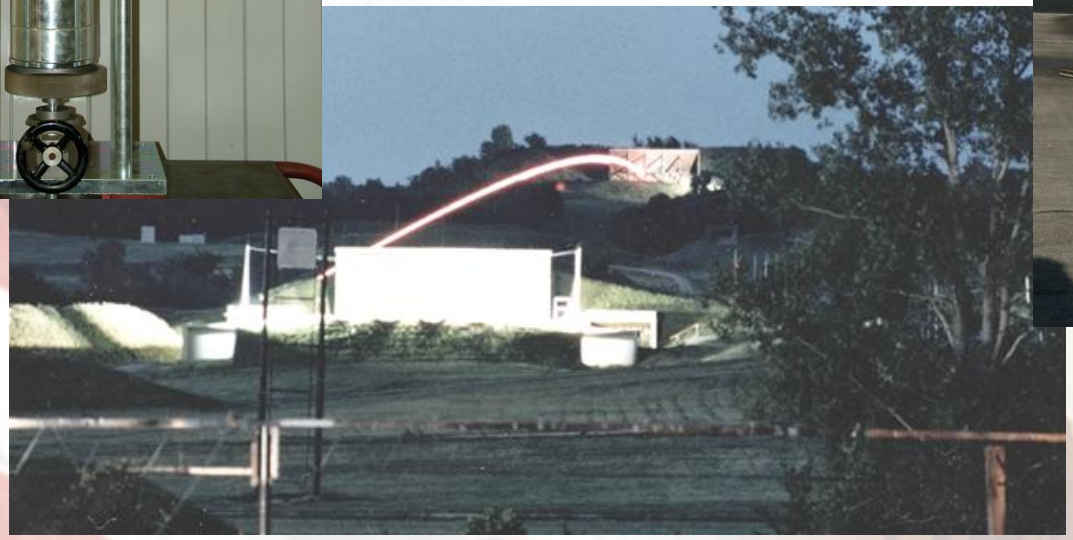
European Regional Test Center (ERTC)

(Pendine, Wales, U.K.)

NATO RTCs







NATO National Test Centers

- National Test Centers (NTCs) are certified by caliber
- NTCs are inspected by the RTC Superintendents & staff
- NTCs are approved by SG/1
- NTCs may conduct the following:
  - Range Standardization Testing
  - New/Replacement Equipment Evaluations
  - New National Design verification against STANAG & MOPI criteria
  - Existing design verification prior to PT submission to RTC
  - NATO Surveillance Testing
- There are currently 12 NATO Certified National Test Centers

Function & Casualty Test

- One of the most important, informative tests for SG/1
- Proves that a foreign ammunition design will work in foreign weapon systems
- Conducted with NATO Nominated Weapons (NNW)
- Test samples are fired through each NNW at -65°F, 72°F, and +125°F
- Test samples are fired in both semi-auto and automatic mode (where applicable)

9mm NATO Nominated Weapons

Belgium – FN Browning Hi Power Pistol

Italy – Beretta 92F Pistol

Italy – Beretta 12S Sub Machine Gun

5.56mm NATO Nominated Weapons

Belgium – FN Minimi Machine Gun

Belgium – FN FNC Rifle

Italy – Beretta AR 70/90 Rifle

5.56mm NATO Nominated Weapons (cont.)

Germany – H&K G36 Rifle

United States – Colt M16A2/A4 Rifle

United Kingdom – H&K L85A2 Rifle

7.62mm NATO Nominated Weapons

United States – M240B Machine Gun
(Pending NNW Evaluation)

United Kingdom – Enfield L7A2 General Purpose Machine Gun

12.7mm NATO Nominated Weapon

United States – General Dynamics M2 Heavy Barrel Machine Gun

25mm NATO Nominated Weapons

Netherlands - Oerlikon KBA-B02AB
Automatic Cannon

United States – ATK M242 Bushmaster
Automatic Canon

40mm High Velocity NATO Nominated Weapons

Note: All pending NNW Evaluation

Spain – Santa Barbara SB LAG-40 M2
Automatic Grenade Launcher

United States – General Dynamics MK19
MOD3 Automatic Grenade Launcher

United States – General Dynamics MK47
Advanced Lightweight Grenade Launcher

Potential NATO Nominated Weapons

- Other potential NATO Nominated Weapons under discussion with ongoing standardization efforts

- 30mm x 173
  - ATK MK44 Bushmaster II Automatic Cannon
  - Mauser MK30-2

- 40mm x 46 LV
  - Colt M203 Launcher (12” Barrel)
  - Colt Canada M203A1 Launcher (9” Barrel)
  - H&K AG36 Launcher

SG/1 Current Thrusts

- 30mm & 40mm Low Velocity Grenade Ammunition Standardization efforts underway
- Development of a Multi-Caliber MOPI for 5.56mm, 7.62mm, 9mm and 12.7mm near completion
- Resolving technical issues with 40mm High Velocity STANAG and MOPI
- RTC/NTC facilitization for 12.7mm and 40mm HV ongoing
- Each NATO nation completes a National Fielded Weapon Survey to ensure that the family of NATO Nominated Weapons is well represented with weapons currently in the field

Sub-Group 1 (SG/1) History

- 1957 – 7.62mm ammunition STANAG 2310 ratified
- 1959 – 1st NATO Qualification of 7.62mm Ball (Canada)
- 1962 – 9mm ammunition STANAG 4090 ratified
- 1964 – 1st NATO Qualification of 9mm Ball (Belgium)
- 1969 – 7.62mm link STANAG 2329 ratified
- 1981 – 5.56mm ammunition STANAG 4172 ratified
- 1985 – 25mm x 137 ammunition STANAG 4173 ratified
- 1987 – 1st NATO Qualification of 5.56mm Ball (U.S.)
- 1993 – 1st NATO Qualification of 25mm HEI-T/TP-T (U.S.)
- 1997 – 12.7mm (Caliber .50) ammunition STANAG 4383 ratified
- 2002 – 40mm x 53 High Velocity Grenade Ammunition STANAG 4403 submitted for ratification
- 2006 – 30mm x 173 ammunition STANAG 4624 awaiting ratification
- 2007 – 40mm x 46 Low Velocity Grenade Ammunition STANAG being drafted

SG/1 Record Of Activity

- To date 95 ammunition designs have been NATO Qualified submitted by 12 different NATO nations
  - 5.56mm – 24 Designs
  - 7.62mm – 47 Designs
  - 9mm – 22 Designs
  - 25mm – 2 Designs

- 22 NATO nominated national weapon systems from 8 different NATO nations (many of these weapons are utilized in many other armed forces around the world)

SG/1 Designs by Caliber

- STANAG 2310 – Small Arms Ammunition (7.62mm)
  - 9 Active Designs
  - 19 Passive Designs
  - 19 Obsolete Designs
- STANAG 4090 – Small Arms Ammunition (9mm Parabellum)
  - 5 Active Designs
  - 13 Passive Designs
  - 4 Obsolete Designs
- STANAG 4172 – 5.56mm Ammunition Linked (Or Otherwise)
  - 12 Active Designs
  - 12 Passive Designs
- STANAG 4173 – 25mm x 137 Ammunition
  - 2 Active Designs
- STANAG 4383 – 12.7mm (0.50) Ammunition Packed As Linked Belts
  - 6 Pending Designs

Other SG/1 Accomplishments

- Implemented 6215 Pressure Transducer, now industry standard
- Highlighted design problems with various weapon systems
  - UK L85A1 Rifle ejection problems led to mid-life improvement program
  - Italy AR-70/90 Rifle magazine issues led to redesign of Beretta magazine
  - Spanish CETME-L Rifle defects due to fluted chamber led to NNW withdrawal
  - French NF1 Machine Gun barrel design problems led to NNW withdrawal
- 5.56mm Minimi Machine Gun Dovetail Standardization for Linked Ammo Packs

NATO Small Arms Ammunition Interchangeability Benefits

- Supports NATO and Coalition Warfare – Forces operate side by side more than ever before
- Supports the need for small arms ammunition which is integral in current operations
- Provides significant ammunition stockpile multiplier - The available world market for small arms ammunition is becoming smaller every day
  - Significant participation from non-NATO nation ammunition manufacturers
- Provides Logistic, Strategic and Tactical Advantages
  - NATO Nations Do Use Each Other's Ammunition Successfully as Evidenced Through Experience in Bosnia / Afghanistan / Iraq
- Many nations only purchase NATO Qualified Ammunition Designs and NATO Nominated Weapon Systems

Conclusion

- NATO Small Arms Ammunition – one of the most important and widely used items on the battlefield and in peace-keeping operations
- SG/1 is the only group within NATO which actually demonstrates the ability of a foreign weapon system to function safely and satisfactorily with another nation's ammunition
- SG/1 offers continuous proof through direct evidence of the ability to interchange ammunition to NATO soldiers on the battlefield

Questions?