

FUTURE AMMUNITIONS FOR URBAN OPERATIONS

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It is the junior leaders responsibility to use the available firepower as provided by combined arms operations. The current military firepower is based on the available means notwithstanding the fact that these were procured with other operational demands and doctrines in mind. Current operations increased the awareness of the military user's unfamiliarity with the ammunition performance against non-traditional targets in confined, populated areas within the rules of engagement, the logistic burden and the high ammunition rate consumption.

On behalf of the RNLA, TNO started a large scale experimental research program in close collaboration with (inter)national partners to become conversant with and assess the performance of conventional current in-use ammunitions: 12.7 mm up to 155mm, AT/ASM and TP ammunitions. Attending the experiments increased the awareness of international partners and visitors from defence, R&D and industry. An international workshop was organised to focus on future ammunition demands, addressing topics such military performance requirements including collateral effects and cost reduction. The need for international collaboration is evident. The overall objective is to improve the safe, effective, efficient and affordable use, procurement and development of ammunition.

INTRODUCTION

Over the last two decades the operational theatre, opponents and rules of engagements have changed considerably. Parts of our military equipment have been adapted or improved to, or has been newly developed to deal with this changed situation. However, still most of the current ammunition in use of the armed forces has been procured with the traditional weapon techniques and operational concepts, opponents and targets in mind. It is the junior leaders responsibility to use the available firepower as provided during the combined arms operations.

NLD EXPERIENCE

The Netherlands experience in Afghanistan illustrated the mismatch between ammunition in use and operational military demands. NLD faced unfamiliarity with ammunition effects, a high ammunition consumption rate, high costs, use of high value ammunition against low value targets, operational risk, safety and collateral effects, mistreatment of ammunition and a gap between education and training and reality [1]. This experience is however not unique.

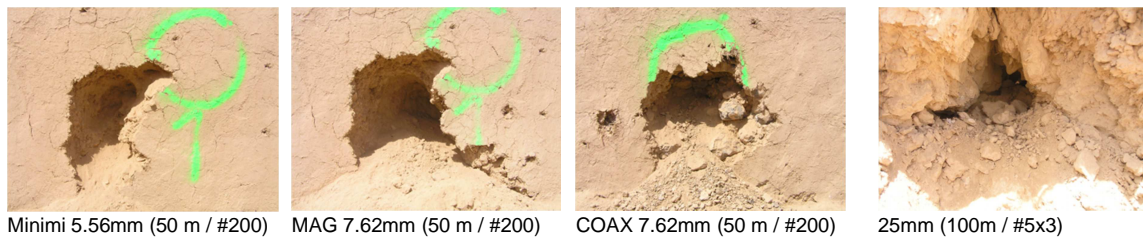


Figure 1 Impression of 2006 NLD military experiments in AFG to familiarize with the ammunition effect on a traditional, local adobe wall (distance / round).



Figure 2 Impression of ammunition treatment due to environment or military pragmatic storage.

TRANSITION

The focus in the traditional theatre was on how to kill the opponents tanks and other armour with the background mind-set 'Win or Lose' and within general known OR WANTED effects.

When we compare this with the current 'Urban Theatre', we are not only lacking knowledge on the effects we already can realize, but more especially on the effects we actually require. To deal with these effects is of course heavenly influenced by the great variety of targets we have to face in urban theatre but also because of the changed interest the military developed in the recent past in regard of for example the RoE's (Rules of Engagement), media and social support. Closely related to those aspects we are now especially interested, not only in the 1st effect we achieve, but in all kind of 2nd, 3rd order effects. The kind of effects that are mostly unwanted because of the unpredicted damage to housing areas, civilian properties, urban systems and probably also responsible for causing civilian casualties and all other kinds of collateral damage. All the question marks in Figure 3 in fact should be answered and valued and the outcome ideally should be translated into the requirements for future ammunitions for Urban Operations (UO), i.e. the *Transition: from past to present and maybe also beyond...*

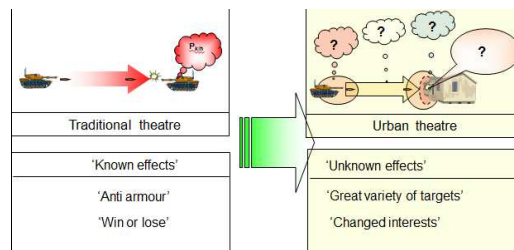


Figure 3 The military paradigm shift

NLD 'IST' EXPERIMENTS

The early AFG experience was the main reason that the NLD MOD tasked TNO to start a large scale experimental research program (2008-2012) to become familiar with the effects of current ammunition in use (12.7 mm up to 155mm, AT/ASM and TP ammunitions) against so called urban targets (concrete, bricks, adobe up to 80 cm thickness). The aim is to understand and define the current 'IST-situation [2].

This ammunition effects 'IST' situation is the starting point for defining the desired 'SOLL' situation. The desired SOLL situation is reached when we have bridged the existing gap between available ammunitions and their effects, the actual technology, tactics and procedures versus the desired ammunitions effects against so called Urban Targets.

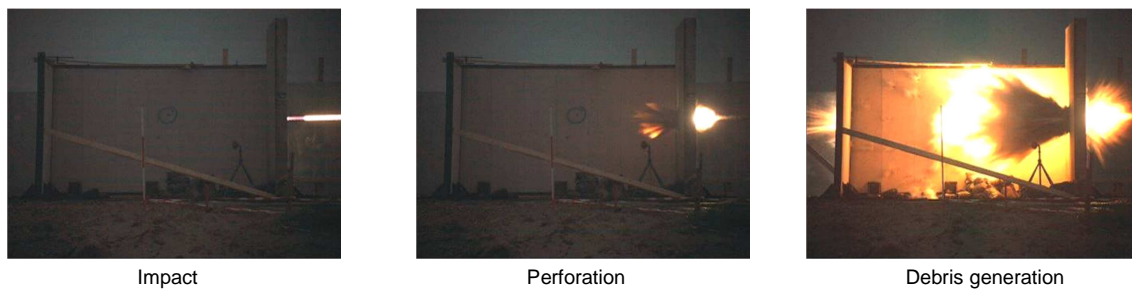


Figure 4 Impression of experiments

NLD UO WORKSHOP

The effect based approach in Urban Operations is more than ever in need of effective, efficient and yet affordable weapon systems and munitions. A clear future vision and a supportive joint roadmap on this firepower related topic is missing, resulting in a certain mismatch between individual MOD needs and industry solutions. It is therefore that the NLD MOD/DMO (Weapon Systems & Ammunition Division) together with TNO and German Industries (RWM, DND and TMS) invited over 30

representatives military participants (UO experts, experts on logistics and testing, policy makers of several MOD's as well as scientists) from the Netherlands, Germany, Denmark, Norway and Canada to participate in a special two day (fall 2011) workshop [3].

The Workshop's theme was the Future Ammunition for Urban Operations with the aim:

- To develop a common understanding of desires and gaps from the MOD perspectives on the one hand;
- To define the required operational effects in urban operations from a military perspective;
- To get acquainted with the possible innovations and solutions at the moment from industry to fulfil the above-mentioned requirements.

As a general result it was acknowledged that it is our responsibility to take some respite to improve the current 'fire fighting' situation. Some common issues regarding ammunitions for urban operations already exist and are probably not surprisingly:

- Both military and industry are still strongly related to Cold War challenges, due to the fact that most of the armies still have great amounts of equipment in their inventory based upon this period. However, there are no valid arguments for old fashioned use of this equipment.
- Most future operations are assumed to be in urban terrain, as currently they already take place, because in current Political and Military thinking the population in whatever what area will be the focusing point, or centre of gravity.
- There is no relevant validated NATO doctrine on urban operations. Relevant definitions of specific tasks in urban operations are non-existent.
- Some NATO publications contain descriptions of the urban environment. Due to NATO's '*Operations are operations*' policy there is still no proper NATO doctrine for UO. Maybe this is the reason that countries have or are developing their own, at least tactical doctrine. Not having such a common scope makes UO discussions very difficult and joint operations hard and confusing.
- National operational requirements experts still have no clear understanding of future military ammunition effect requirements. Defence industries therefore do not know which ammunition technologies to develop. This is also influenced by (sometimes) lack of (sometimes prohibited by national laws) sharing of Lessons Identified or Learned.
- National defence budgets are slim now and will not grow dramatically over the next decade, so fewer orders and less numbers for industry;
- Defence industries have problems to maintain the current production lines and/or develop new technologies when military demands are not defined.

To conclude, military, R&D (Research & Development) and industry are condemned to each other because of this mutual dependence and all kind of existing rules and strategic reasons. All the parties need directions to break this dangerous deadlock.

SUGGESTIONS FROM INDUSTRY

Example:

A country had over 200 types of ammunition in the AOR in Afghanistan, another country used 163 types of ammo for the Army/Support Elms and about 34 additional for Air force/Army Aviation Elms, so in total 197 types of ammo. Although both armies have NATO standard weaponry and calibres in their inventory it is very questionable how many types of ammunition really are inter/exchangeable. In reality, most of the participating nations in Afghanistan used more or less the same or comparable weaponry and therefore also in general comparable versions and/or types of ammunition.

To overcome these and other well-known military problems (high cost, logistic burden and lack of operational inter/exchangeable), industry proposed a so-called 'requirements for requirements' mainly focused on standardization and interoperability of ammunition.

1. Align civil regulations and operational regulations;
2. Use one international standard user profile applicable for all nations;
3. Define realistic terminal ballistic priorities;
4. Define standard definitions for targets, ranges and damage criteria;

5. Define a standard (not maximum) definition for ammunition safety;
6. Choose realistic climatic zones for ammunition development;
7. Use lessons learned for ammunition improvement;
8. Actualize and accept STANAGs, ITOPs, etc.;
9. "Better using a 95% solution than wait for the 110% solution!"

The 'requirements for requirements' are well appreciated by the military experts and made them aware of the significance of standardization and interoperability.

MILITARY UO TASK DEFINITIONS

Military effect demands, if they exist, are not directly suited for procurement or development. The operational demand 'wall breaching' is for instance interpreted as creating an entry point, large enough for a soldier to pass through, preferable in an unrestricted manner, in an upright position, and be rapidly followed by another soldier.

An example of the workshop outcome is provided below, dealing with the well-known 'WALL BREACHING' objective, worked out in a concept for the familiar NATO AAP-6 format.

Wall breaching:

- A method aimed to create 'free' passageways (access or exit) and/or (entry point) in inner and/or outer walls, floors, ceilings and/or roofs of buildings and/or objects in order to support military activities.

Intent/effect:

- To create a free opening wide enough to give a safe and undisturbed passageway to an (un)equipped soldier. By surprise, within very short reaction time (< 5 sec) and to be used at nearby distances (< 5 m) and the effect limited to the desired wall.
- To eliminate opponents behind these breached walls and/or floors.

The following definitions are based on analyses of various studies relating to the size of man-size holes (US Army ATTP 3-06.11 June 2011):

- *Loopholes.*
Loopholes are firing apertures (a minimum of 20 cm (8 inches) in diameter) made in a structure.
- *Mouse holes.*
Mouse holes are openings made to the interior or exterior of a structure (walls, floors, ceilings, and roofs) to aid inter- and intra-building communications and movement. A mouse hole is usually a minimum of 60 – 75 cm (24 - 30 inches) in size.
- *Breach holes.*
Breach holes are openings made in a structure using mechanical, ballistic, explosive, or thermal means to aid the entry of assault elements. A breach hole is a minimum of 125 -75 cm (50 by 30 inches) in size.

The military participants of the workshop

- Agreed upon and improved overall generic effect requirements.
- Agreed upon the proposal for a set of tasks definitions and descriptions as provided by the NUO NTG TG.
- Provided a validation of desired dimensional effects.

AMMUNITION EFFECTS: DESIRED OR CONCERN?

The objective of the military commander is to

- Engage opposing entities before walls, buildings etc.
- Engage opposing entities and means behind walls, in buildings etc.
- Breach a hole in a wall to facilitate infantry to enter the building etc.
- Defeat, i.e. (partial) destroy infra.

Military operations in confined operational theatre includes the vicinity of own or friendly troops, third, non-involved parties, opposing entities. The junior military leader concern should not be limited to the effects in the target area, but should include the *complete* exposed area when delivering fire, thus including the area covering the physical phenomena (see also Figure 3):

- the area around the firing platform, i.e. effects such as muzzle blast, flash, ground shock;
- the area covered by the flying projectile, i.e. effects such as sabot and ammunition parts, initiation, 3D environment effects;
- the target area and local vicinity, i.e. the effects of fragments, debris, blast, ammunition rest performance, target integrity;

implying that delivering fire may affect the:

- *Operational tempo*, related to follow on activities of own or friendly forces;
- *Operational risk*, related with exposure of *own and friendly* troops ('man – unsafe' area);
- *Operational safety*, related with exposure of *third parties*, non-involved people;
- *Collateral damage*, related to materiel damage to the local infra-structure etc.
- *Structural integrity* of the infra-structure, thus 'unsafe' to enter buildings etc.

The junior leader should be trained up to a certain military maturity level to be capable to handle these different point-of-views in a balanced way. Procurement, R&D institutes and industry are in urgent need for military [NATO, national] supported definitions and criteria to handle them constructively. A suggestion for a pragmatic first approach to assess the advantages as well as concerns dealing with different ammunition technologies (calibres & principles) is visualised in figure 5.

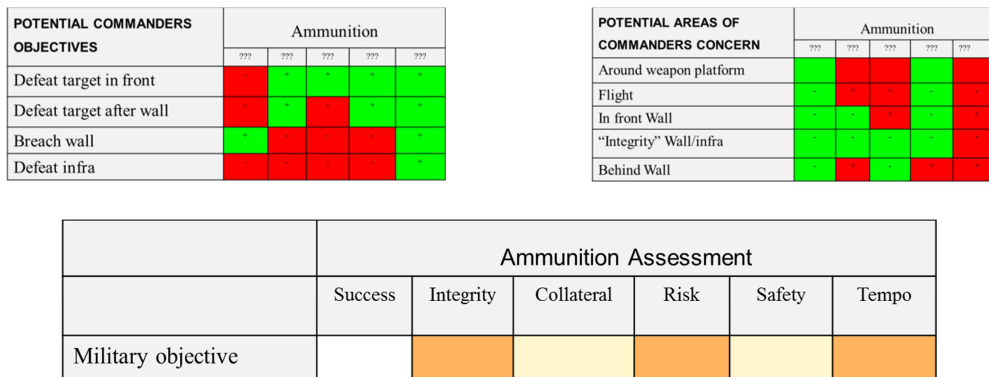


Figure 5 Multi criteria assessment of Ammunition effects

CONCLUSION

If the situation remains as is, all parties but especially nations will continue to (fast/urgent) procure relatively small amounts of equipment, (special) weapon systems and/or ammunitions. This forces the defence industries to set up only small production lines leading to relatively high costs. Lack of national and/or other financial support, will dramatically decrease the change of survival of (parts of) the defence industry. So, the customers (the nations) have to pay for it and with small acquisition orders you will always be last! Last but not least this could lead to the situation that in case of dangerous security conditions, no defence materiel, equipment, weapon systems and ammunitions can be acquired in time to improve military capabilities and equipment, bring stocks up to the desired levels, etc.

(NATO) nations and their politicians understand the current threatening situation and are willing to take measures in time. They need to firmly improve cooperation between MODs, armed forces, R&D institutes and existing industry. A high level of interoperability will dramatically decrease logistic footprints and therefore costs. An improved NATO or EU organization with a minimum of

bureaucracy and being able to deal with military issues in a 'quick and pragmatic way' could form the right fundament to achieve the required capabilities available in time to deal with future missions.

It is the junior leaders responsibility to use the available firepower during his urban operations as provided by combined arms teams. It is the responsibility and the awareness of the organisation to provide the correct tools and training.

References

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