

NEXT GENERATION SAFETY CONCEPTS FOR BOTH STORAGE AND THE OPERATIONAL USE OF AMMUNITION



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In May 2019, the Commander-in-Chief of the Dutch Armed Forces publicly stated: “How can we achieve an increased level of safety while working with ammunition? What is required for the experts to be able to carry out their work properly, quickly and safely?” This question showed that there is an urgent need to continually develop knowledge in the field of ammunition safety, while, simultaneously, recognizing that the principal areas of focus in this field may change over time, as a result of technological developments and ever-shifting organizational and political conditions.

OBJECTIVES

The main objective of this programme is to build, secure and apply knowledge, skills and infrastructure within the following areas: 1. Functioning and Safety of ammunition (state of the art and innovative safety concepts); 2. Management and logistics of ammunition (smart and effective ammunition storage); 3. Safety of Personnel (use of ammunition under different conditions); 4. Life cycle Management (degradation of ammunition).

These four areas constitute the subjects of the four work packages within this programme.

SCOPE OF WORK

The issue of ammunition safety is currently receiving widespread attention. This interest stems from several high-profile accidents involving ammunition in recent years and the resulting political attention that these events garnered. Consequently, ammunition safety has emerged as an important subject across several parts of

the Dutch Ministry of Defence (MoD), including within the Munitions Branch, the Knowledge Centre for Weapon Systems and Ammunition, the Military Committee for Dangerous Goods. At the same time, the programme team Obelix was initiated to monitor improvements in the field of ammunition safety on behalf of the Materials Branch.

It is in the same time that the MoD is recruiting new personnel, ammunition is encountering new threats and there is an increased pressure on storage facilities in light of the fact that the strategic stock of ammunition is growing. It is therefore of paramount importance that TNO supports the MoD, both at this juncture and in the coming years, by providing them with the requisite knowledge and skills in the field of ammunition safety.



A number of technological developments have been found to influence the ability to safely work with and store ammunition, including, among other things, Application of sensors (Internet of Things, IoT), Autonomous machines (Artificial Intelligence, Machine Learning), new and unknown types of threats (High Energy Laser), new materials and the Munitions storage facility of the Future.

The scope of work is diverse. In WP1, the research focuses on innovative munitions concepts, which are insensitive to external threats during both transport and storage. As well as achieving their required end-effects, these concepts could also result in reduced costs for transportation and storage, or even a reduction in the Hazard Classification. In this respect, the concepts will have to fit in with the munitions needs of the MoD in the 2030–2040 timeframe. WP2 seeks to enhance knowledge development in the field of efficient and safe storage of ammunition. A concrete blueprint of the steps required to develop the Munitions storage facility of the future are provided. Recent developments within the MoD have shown that an increased storage capacity per square metre is required. Alongside this, increased efficiency in the logistic process is also required (speed, traceability and number of actions), while, simultaneously, guaranteeing the safe availability of ammunition. WP3 focuses on what is needed to reduce the risks for military personnel, so that they are sufficiently protected when carrying out their tasks. In WP4, special attention is paid to conducting a life cycle analysis of ammunition. This pertains to the fact that, over the course of its life cycle, ammunition

is exposed to a wide range of external conditions, which detrimentally impacts upon its quality, safety and performance. The degradation of ammunition components results in the degradation of the whole item and, in turn, reduces the timeframe in which it can be safely used.

RESULTS

The results of the programme can potentially be applied during the lead time of the programme. Close cooperation with the MoD is therefore of paramount importance. The results will help to stimulate new initiatives and innovations, not to mention contributing to activities that have been employed for some time already. An example of such an activity is the field of Munitions Health Management. Special attention will be given to employing activities that have been defined in the roadmap of the Munition Storage Facility of the Future. Where possible, the results will be shared internationally during conferences and symposia, or in NATO activities and working groups, such as, for example, the Applied Vehicle Technology panels or Data Exchange Agreements with the United States.

ABOUT TNO

TNO is an independent research organization. We connect people and knowledge to create innovations that boost the well-being of society and the competitive strength of industry in a sustainable way.

TNO works in collaboration with partners and focuses on nine domains, including Defence, Safety and Security, where we focus on technological and behavioural innovations for people working in defence organizations, the police, emergency organizations and industry.

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PROGRAMME INFORMATION

Programme manager TNO

Ir. P.A. (Peter) Hooijmeijer
Department of Energetic Materials
TNO Defence, Safety & Security

E peter.hooijmeijer@tno.nl

T +31 888 66 23 95

M +31 (0)6 20 59 18 09

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