

LABORATORY FOR BALLISTICS RESEARCH

TNO

TNO is an independent innovation organisation that connects people and knowledge in order to create the innovations that sustainably boost the competitiveness of industry and wellbeing of society.

TNO focuses its efforts on seven themes including Defence, Safety and Security: TNO works on a safe and secure society by creating innovations for people working in the armed forces, law-enforcement agencies, emergency services and industry.

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TNO.NL/BALLISTICS



TNO innovation
for life

TNO.NL

TNO is an independent not-for-profit organization that has been active in ballistics research for decades. TNO provides world class enabling technology for ballistic protection solutions and their qualification. Qualification is provided according to all major standards such as STANAG / MIL / VPAM / CEN / NIJ. TNO aims to support the product development of its customer by maintaining modern diagnostics, allowing for excellent testing of ballistic protection solutions.

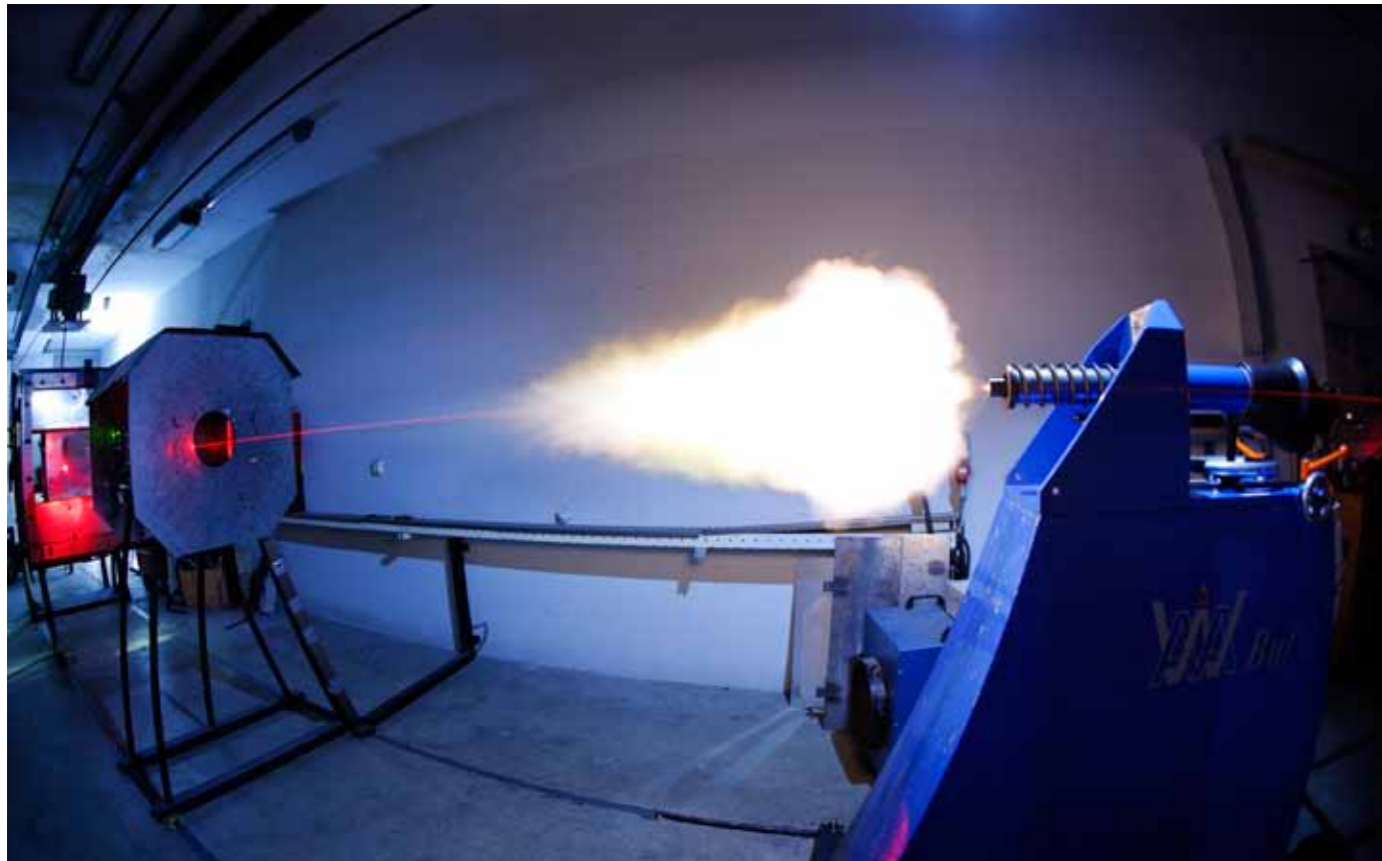
FACILITIES

The Laboratory for Ballistics Research is ISO/IEC 17025 accredited and also has a NEN-EN-ISO 9001:2008 management certificate. It includes three indoor firing ranges and a target bunker that can handle any type of KE/HE projectile (between 5.56 mm and 76 mm) or weapon system (smaller or equal to 105 mm). Projectiles can be accelerated up to 2600 m/s. The target bunker allows the detonation of up to 25 kg TNT equivalent HE material. Among other recording assets the facilities include multiple X-ray pulsars (up to 1200 keV) and hispeed cameras with up to 1 million fps with 100 frame capacity.

SERVICES

The customers of our facilities consist of defence ministries, the international defence industry as well as the civilian industry. Services range from qualification of bulletproof vests to testing spall liners against EFP's according to the latest STANAG standards. Please find some of our services below.





BALLISTIC PERFORMANCE AND PROTECTION

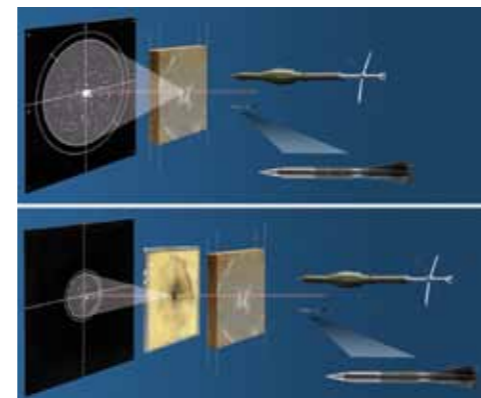
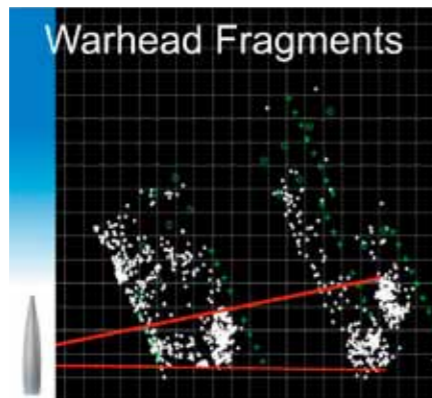
TNO tests and validates the performance of personal ballistic protection innovations with the latest standards. Furthermore, full diagnostics in the domain of munition lethality and human vulnerability (e.g. blunt trauma) is available.

FRAGMENTATION ANALYSIS

TNO offers indoor fragmentation tests for warhead calibers of up to 155 mm. Results can be given in JMEM or other formats suitable for input of lethality- or vulnerability assessment software such as TARVAC which is also developed by TNO.

SPALL-LINERS

TNO can accurately determine the reduction of the spall cone from your spall-liner. The test setup is compatible with any shape or size of armour and spall-liner.



STANAG 4569 QUALIFICATION

TNO can qualify your vehicle armour according to all levels of STANAG 4569 and can help you modify your armour for successful qualification. Because TNO is also closely involved with the creation of new STANAG's, TNO has intimate knowledge of STANAG pass/fail criteria.



LIVE RPG WARHEAD ACCELERATOR

Live firings are essential to ultimately prove the effectiveness of armour. TNO has developed a tool for indoor live firing of RPG type warheads. With regard to live firing of RPG's, the inaccuracy of the impact location is always an issue. The warhead accelerator developed by TNO guarantees the desired impact location and velocity. Because the firing is indoor, measuring equipment is easily installed, allowing e.g. close-up high speed video.



BLAST TESTING AND DATA ACQUISITION

TNO has a team that works on recording highly dynamic events as a result of blast. This can be done outdoor, indoor or offshore.

- Blast conditions can be measured for up to more than 1000 kg. TNT NEQ.
- Displacement, acceleration and deflection can be measured on infrastructures.
- Hybrid III dummies can measure forces as a results of blast.



INFORMATION
Please visit our website www.tno.nl/ballistics for an overview of all our services