Defence

TNO | Knowledge for business

Military vehicle protection

Finding the best armour solutions

Developments in vehicle armour never stop. It's not just the nature of the threat that is continually changing, but we also have to deal with new trends in warfare, like lightweight armoured vehicles. For survival, today's and tomorrow's military vehicles will not only have to rely on armour, but e.g. also on mobility and manoeuvrability. TNO supports its clients - governments and manufacturers - in finding the best armour solutions for their vehicles.

New developments and trends

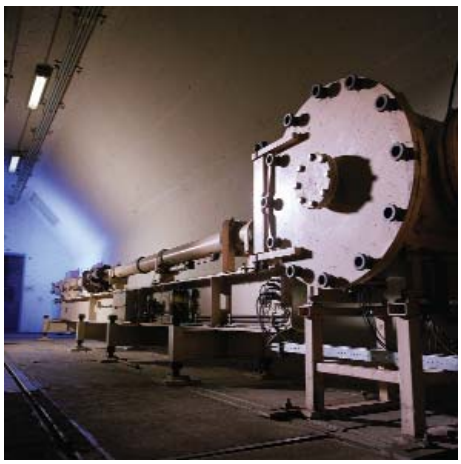
At present, Western armed forces are increasingly being committed to expeditionary operations, e.g. as part of a peace-keeping mission. Much of their materiel will have to be airlifted, including combat vehicles. These vehicles therefore have to be both light and sufficiently armoured. Ultimately, the physical protection of the people inside the vehicle is always the first priority, calling for the optimal vehicle armours best suited to the prevailing operational conditions. Armours include metal alloys, ceramics, polymers and fibre-reinforced composites, and combinations of these. In the foreseeable future, vehicles will - depending on their task - be fitted with reactive armour or electromagnetic short-circuit armour. All these current and future armours require constant and rigorous testing under fully controlled conditions. The Laboratory for Ballistic Research is a state of the art research facility of TNO and able to provide these conditions.

New threats

In today's scenarios, the threat to a military vehicle may come from any direction, including above and below. The crew of a military vehicle not only has to deal with more or less 'standard' fire from the enemy in front, but - more often than not - also with asymmetric threats like rocket-propelled grenades, explosively formed projectiles, mines and improvised explosive devices. The RPG7, for instance, is able to cut through 250 mm of armour steel. Falling prey to any of these threats, also known as a 'cheap kill', is something that has to be avoided at all times. TNO uses its highly advanced resources and decades of expertise in armour research to help governments and manufacturers achieve their aim: the optimal protection of military vehicles against the widest possible range of ballistic threats.

What we do

At the TNO's Laboratory for Ballistic Research we perform live firing tests on all known (and unknown) armours. These tests include the penetration and perforation of steel, aluminium and titanium armours, ceramic-faced armours, sandwich armours ((non-) explosive reactive armour), composites and spall liners. TNO also houses an extended knowledge-base on Behind Armour Blunt Trauma (BABT) and Defensive Aids Suites (DAS). This knowledge is available to clients seeking to optimise the ballistic protection of their armoured vehicles, both inside and outside. TNO supports its clients in the specification of the relevant threats, vulnerability analyses and the improvement of ballistic protection. However, what makes our facility really special is the ability to combine both live tests and modelling and simulation. Recent achievements include the new mine protection kit for the Leopard 2A6 upgrade and the mine protection qualification test for the CV9035NL Infantry Fighting Vehicle. TNO is able to model any required ballistic impact phenomenon and explosion effect, and verify these at our own firing ranges. In short: if your vehicle concept has any weak spot not complying with STANAG 4569, TNO will find it and fix it for you.



The Laboratory for Ballistic Research is a research facility of TNO and include various indoor firing ranges handling any type of kinetic energy projectile (≤40 mm) and high-explosive projectile (≤90 mm). The target bunker allows the detonation of 25 kg of high-explosive material. The maximum launch velocity for a 0.5 kg launch package from the 79 mm laboratory powder gun is 2,500 m/s. All experiments are recorded using ultrahigh-speed cameras, X-ray pulsers and computerised databases. Fully automated testing and registration procedures are our best guarantee for the constant quality of our test results.

TNO Defence, Security and Safety

TNO Defence, Security and Safety provides innovative contributions to the advance of comprehensive security and is a strategic partner of the Dutch Ministry of Defence to build up the defence knowledge-base. We employ our acquired knowledge for and together with contractors.

E.J.M. (Ed) van Riet

T +31 15 284 37 27
F +31 15 284 39 73
E ed.vanriet@tno.nl

Lange Kleiweg 137
P.O. Box 45
2280 AA Rijswijk

info-DenV@tno.nl
www.tno.nl