TNO | Knowledge for business

Products & Services

Projectile Orientation Measurement (POM)

To evaluate the ballistic resistance of materials TNO uses an unique equipment to measure the impact angle (yaw) immediately before impact. Ballistic standards for testing of armour systems prescribe the projectile velocity as well as the maximum allowable yaw angle. TNO has developed an optical (contact-less) measurement system which measures the velocity and orientation of the bullet prior to impact in real time and with high accuracy.

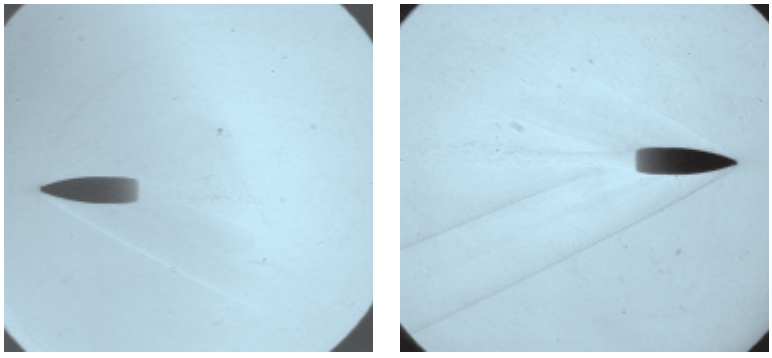
Projectile orientation

The Laboratory for Ballistic Research at TNO is one of Europe's leading ballistic testing, evaluation and engineering centers.
The products under study are amongst others helmets, vests, goggles and protective footwear.
For evaluation of ballistic impact experiments measurement of projectile orientation is crucial. A slight yaw (deviation of projectile axis from the velocity vector) reduces penetration and perforation capabilities of the projectile. This will affect experimental results.
For this reason the Projectile Orientation Measurement Device, known as the POM system, was developed.

POM

A traditional way to measure projectile orientation comprises the use of yaw-cards (pieces of cardboard placed in the flight path of the projectile). Apart from being inaccurate, this method does not consider the interaction between the projectile and the cardboard.

Furthermore the process is time consuming and hence expensive, it requires elaborate interpretation.
Therefore a method was developed enabling projectile orientation measurement precisely in a non-contact way, before impact. The POM system consists of two orthogonal CCD cameras and corresponding independent flashlight sources. Through digital image processing the system can close to instantaneously determine the orientation of the projectile directly prior to impact. This device can be used for 2-20 mm calibre projectiles, at velocities ranging from 200 to 1500 m/s.



7.62 mm projectile at 800 m/s

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Advantage

With the POM system we have created an instrument to determine with great accuracy both position and direction of projectiles directly prior to impact.
The main advantage is that conditions at projectile impact are better known enabling to be conducted in a consistent manner experiments.

TNO Defence, Security and Safety

'TNO Defence, Security and Safety' is the title under which TNO operates as a strategic partner for the Dutch Ministry of Defence and makes innovative contributions to enhance the safety and security of the Netherlands both at home and abroad. We also use our accumulated knowledge for businesses, industries and foreign governments.

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