

# CHARACTERIZATION OF FRAGMENTING AMMUNITION



**TNO** innovation  
for life

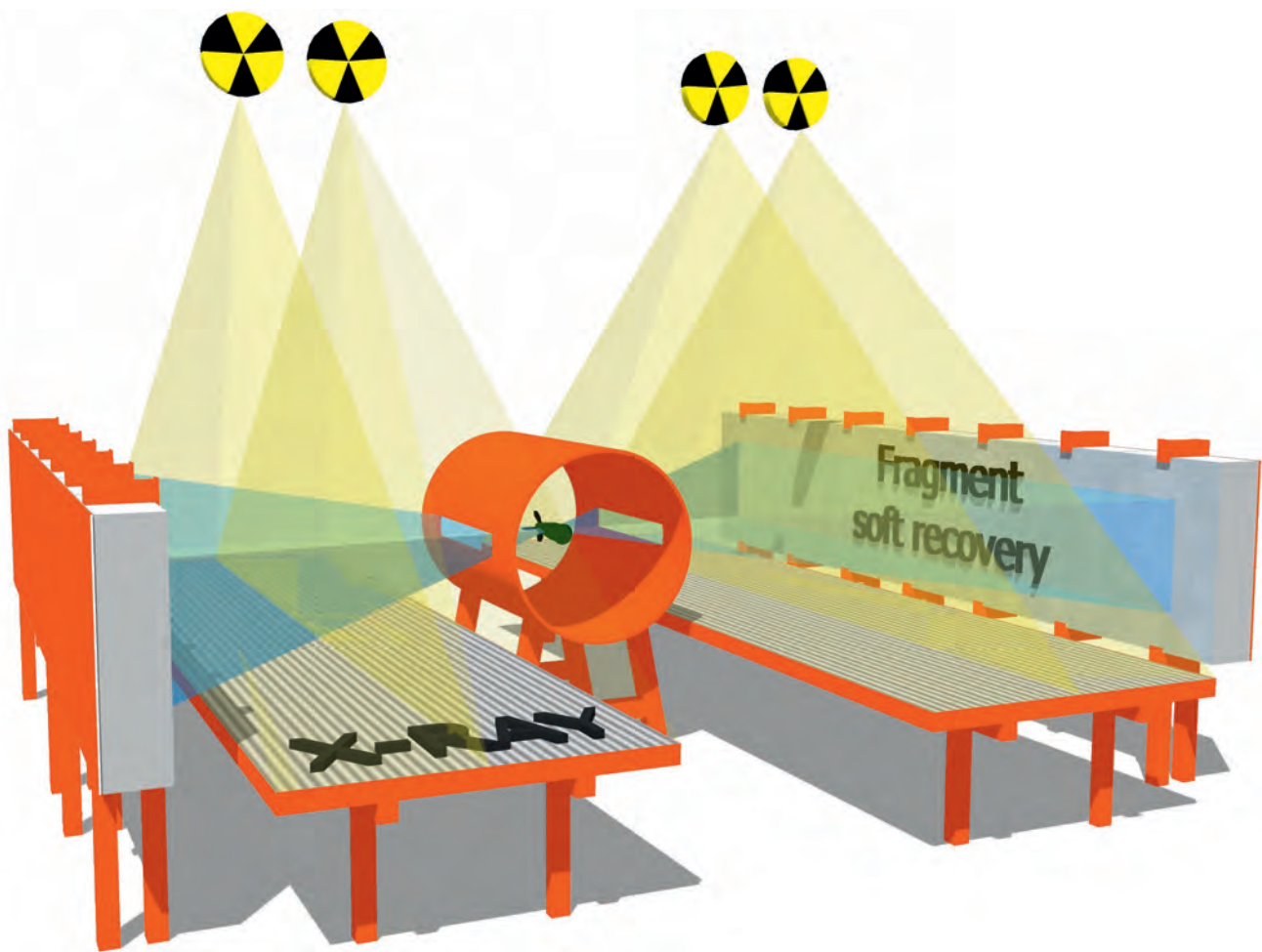
## IN SUPPORT OF

- Evaluation of ammunition characteristics and performance
- Ammunition design studies

## CAPABILITIES

- Well-conditioned indoor fragmentation experiments
- Simultaneous determination of spatial mass and velocity distribution
- Static fragmentation of ammunition for calibres up to 155mm
- Dynamic experiments feasible for calibres up to 76mm

# EXPERIMENTATION



## FRAGMENTATION CHARACTERISTICS

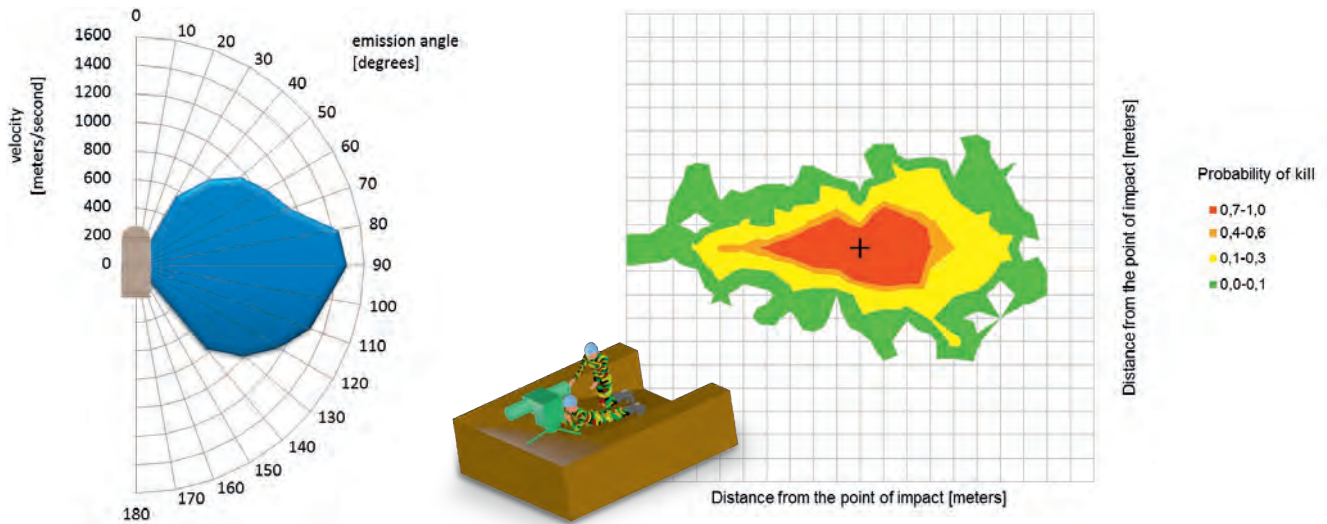
Individual fragments are characterized by:

- Emission angle
- Mass
- Velocity
- Material
- Shape factor

## ADVANTAGES OVER ARENA TESTS

- Visualization of the fragmentation pattern
- More accurate fragment velocities
- More in-depth fragmentation characteristics

# SIMULATION



## FRAGMENT IMPACT

Based on the fragmentation characteristics, a three-dimensional fragment flight path can be calculated. This enables TNO to determine the impact condition for each fragment:

- Position
- Angle
- Velocity

## AMMUNITION LETHALITY

TNO uses dedicated software to determine the lethality of the ammunition against a wide variety of (highly detailed) targets:

- Personnel
- Platforms (land, air and sea)

› **MORE INFORMATION**

Please visit our website  
[www.tno.nl/ballistics](http://www.tno.nl/ballistics) for an  
overview of all our services

› **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 defence organisations, the police, emergency services and industry.

**CONTACT**

**Bastiaan Geluk**

E [bastiaan.geluk@tno.nl](mailto:bastiaan.geluk@tno.nl)

T +31 888 66 84 20

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