Men faced with blast waves

Understanding and preventing blast-related injuries in dismounted soldiers

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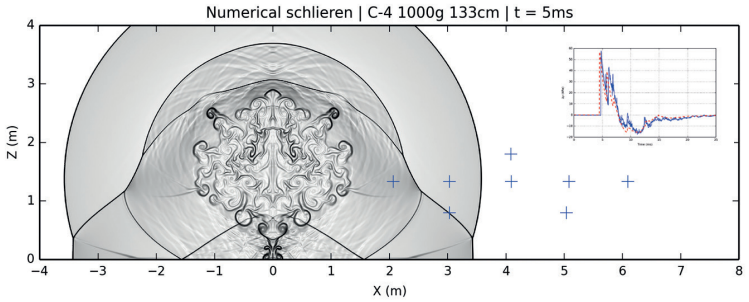
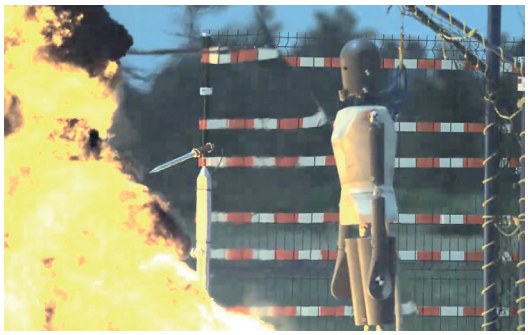
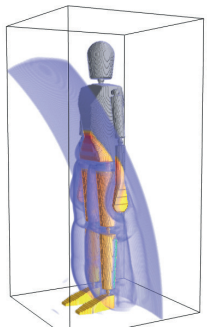
Military and homeland security forces as well as civilians are increasingly faced with explosions, particularly blast waves caused by IEDs, car bombings, suicide bombings, industrial disasters, etc.
The nature of the explosive device, the distance to the charge, the location of the victim and his/her garments, including personal protective equipment, are key factors which have an influence on the severity of the threat.



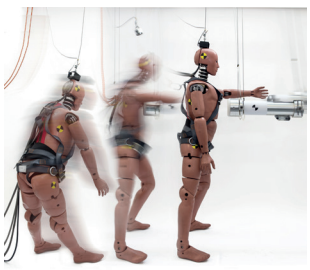
Characterisation of the threat (pressure-time history) at any point of the space (above) and when the shock wave engulfs human body parts (below).





The development of testing methodologies and dedicated numerical tools is based on the knowledge that has been acquired in the past decades about the physiological effects caused by impulse noise, blast and blunt impacts on the human body. Injury risk criteria are being revised and/or new ones will be proposed. Recent findings give new insights into ways of improving personal protection.

Instrumented mannequins such as the Hybrid III or the specifically designed ISL mannequin fitting the timescale of the blast event are used and continuously improved.



Needs

- Better understanding of the injury mechanisms acting on the head, neck and trunk (thorax and abdomen)
- Improving existing numerical models
- Improving individual protective equipment

Tools & facilities provided by ISL

- The in-house development of dedicated computational fluid dynamics (CFD) models
- A specially instrumented mannequin for blast testing
- Testing field to simulate life-size explosions
- Shock tubes and impact pendulums designed to carry out experiments at the laboratory scale

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