DRI DIRECT MEASURMENT DEVICE

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Summary

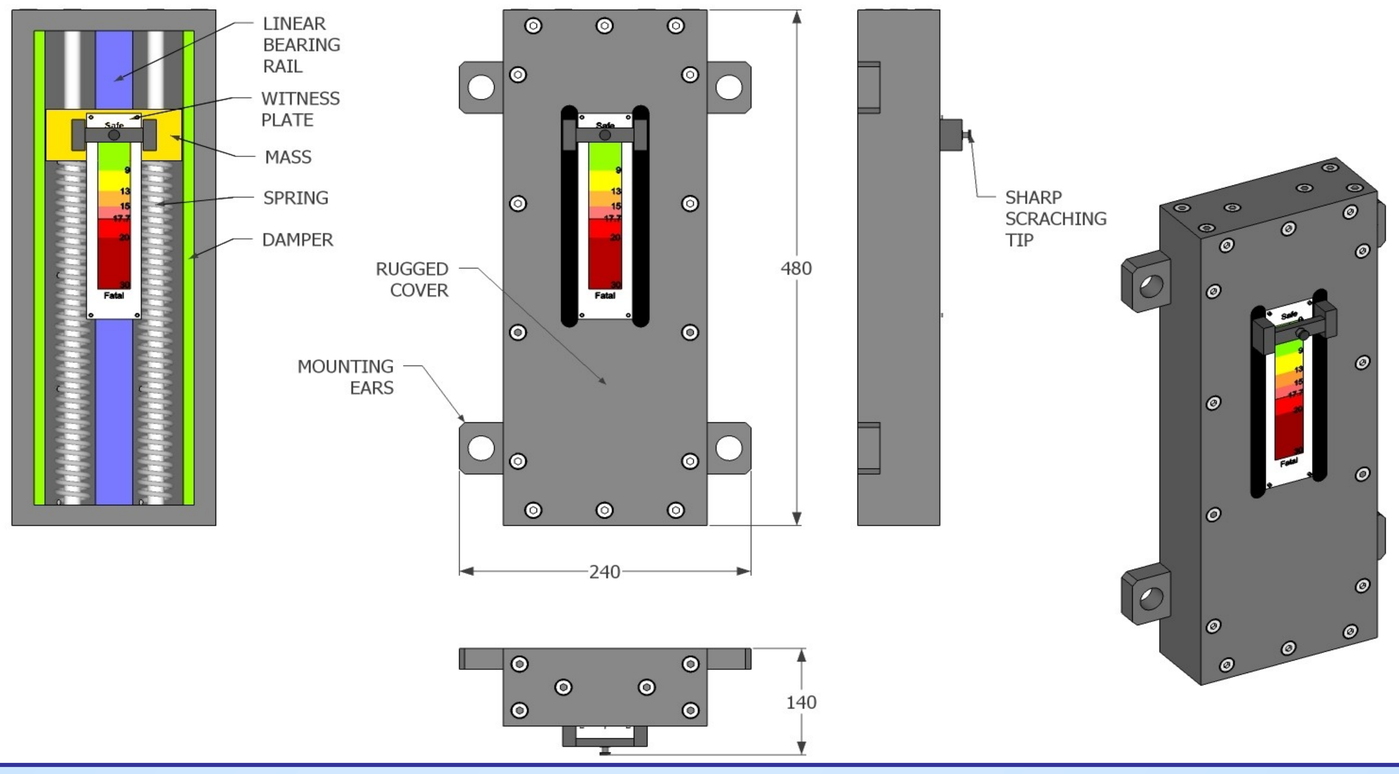
In case of mine detonations under an armored vehicle, occupants are subjected to the global vehicle acceleration. Significant body injury is related to the spine loads under vertical shock. DRI is a dimensionless value related to spine deflection given by the output of a mass-spring-damper system with vertical pelvis acceleration as input. Dynamic Response Index (DRI) criteria defines the spine injury magnitude. DRI is a major parameter for qualification of a protected vehicle according to STANAG 4569 requirements. It's measured during blast test, using hybrid III dummies. Measurements involving hybrid III dummies are expensive and risky for the dummies, mostly during the development phase. Therefore, we have developed a mechanical low-cost device which easily and instantly provides DRI measurement.

The developed mechanism represents a second order model according to standard definition of natural frequency and damping coefficient. Since the system indicates a mass-spring-damper direct deformation, we found it practical, repeatable and accurate. Practicality is achieved by having real time results (post test raw data analysis is not required) using a standalone system, no additional external devices (power supply, cables, etc.) required.

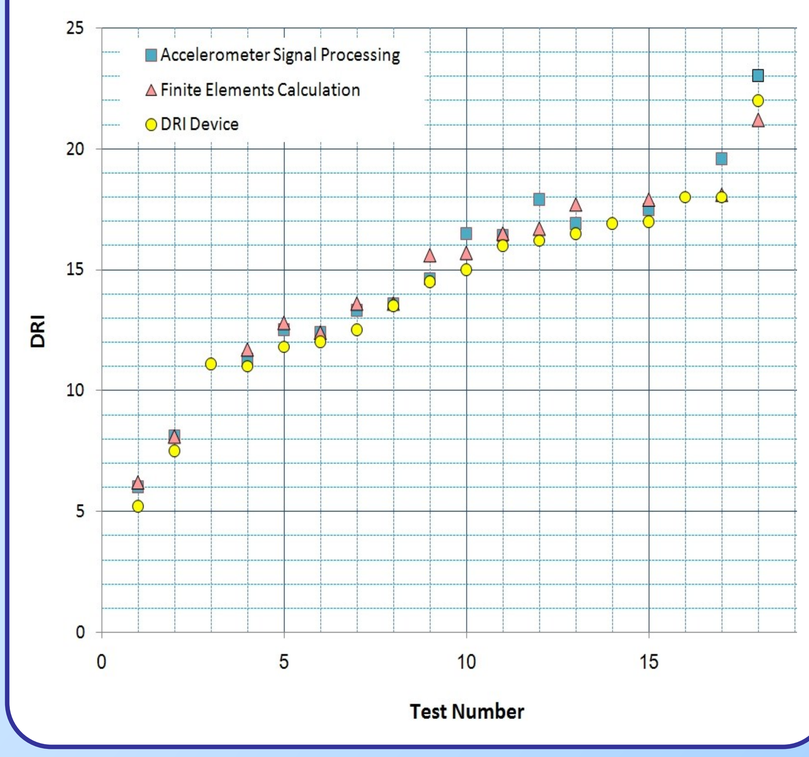
The device consists mainly of 2 parts: (a) dynamic response measuring mechanical device (b) envelope made of reinforced polyurethane (representing human body). It can be positioned on the vehicle's seats and tightened with the original seat belts of the vehicle. The measuring device can be used also as a measuring device for the vehicle's vertical input impulse as an indication if energy attenuating seats are actually needed. This is achieved by attaching the compact mechanism to the vehicle side walls. Furthermore, the device can be complementary when more than one Hybrid III dummies are needed.

The device was tested with comparison to hybrid III and acceleration sensors on a series of blast and drop tests, and has been proven as an accurate, compact low-cost device.

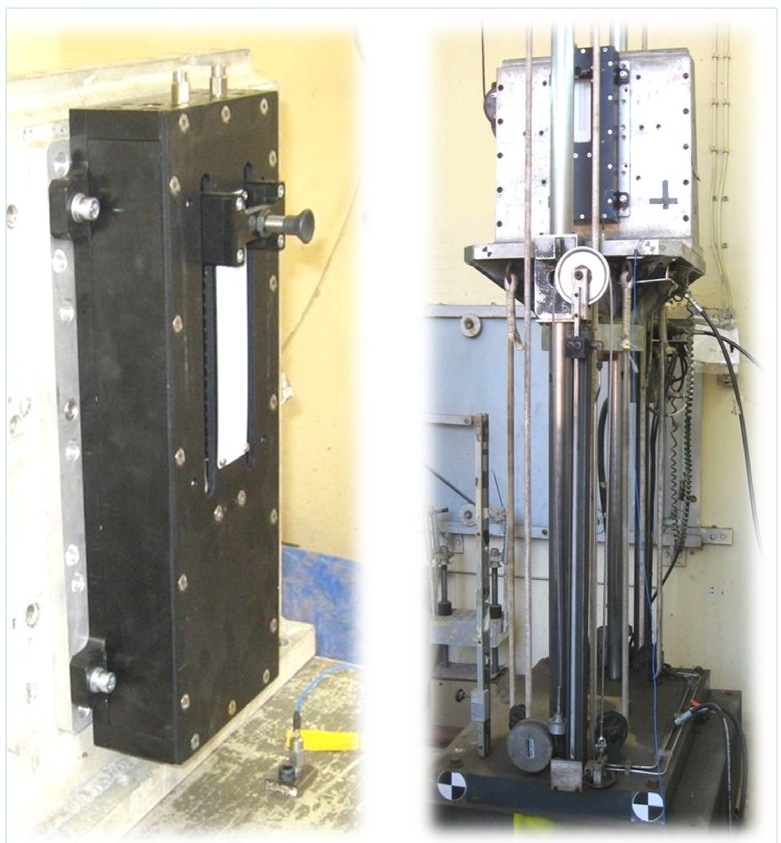
Structure



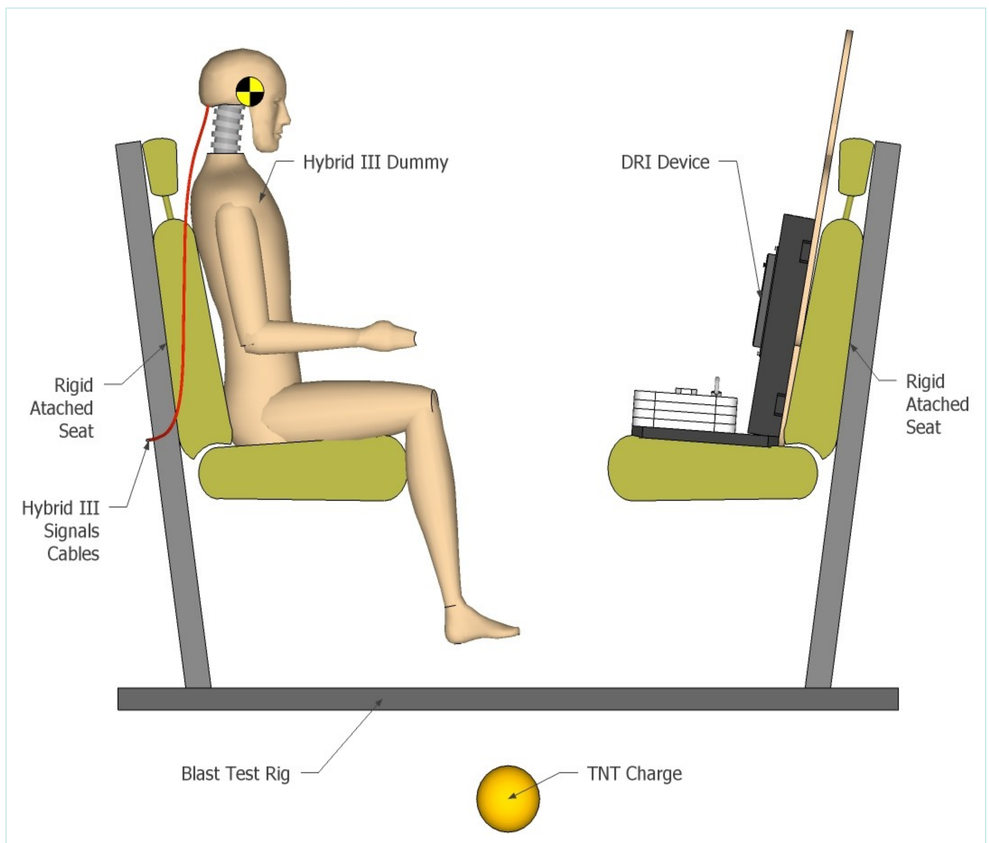
Numerical simulations



Experiments



Drop test



Blast tests