



APROSYS FINAL EVENT

Integrated Project on Advanced Protection Systems



Advanced Protection

New protection systems for vulnerable road users

Add-on for improved vulnerable road user protection for heavy vehicles

FUNCTIONALITY

The "Safety Bar" offers additional crush space in order to reduce injury risk due to the primary impact of VRUs with heavy goods vehicles.

EXPLOITATION

- Add-on solution with short to market time offered by accessory industry
- High acceptance by driver expected

SOCIO-ECONOMIC IMPACT

- Reduction of the number of injured VRU
- Reduction of VRU injury severity in impacts with heavy vehicles

TECHNICAL DESCRIPTION

Objective

Providing an add-on solution for improved vulnerable road user protection for heavy vehicles that could be offered by accessory supplier.

Approach

The analysis of various safety bar designs included plastic tubes, foam applications and steel plastic hybrid designs has shown that loads and injury risks related to the primary impact can be largely reduced (up to 97%) at low costs, little additional mass (20-40 kg) and little additional length (130-200mm). It was further shown, that the front-end might be easily retro-fitted without covering essential areas for other vehicle-functions like lighting and cooling. Reparability, servicing and accessibility are marginally influenced.

Concepts

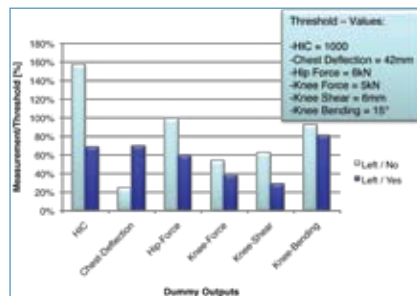
- Different concepts were analysed to mitigate structural interaction of in VRU-to-truck accidents (e.g. inflatable tubes, inclined front, safety bar)



Inflatable tube concept

Virtual design

- Based on the evaluation method in the Heavy vehicle aggressivity index (HVAI) optimisation was performed (pedestrian impactor).
- Also numerical testing with pedestrian models was performed.
- Significant reductions of biomechanical criteria could be obtained



Results of numerical testing with pedestrian dummy (conventional front vs. safety concept)



Impact of pedestrian dummy vs. safety bar (30 kph)

Summary / Outlook

- Safety bar concept is an intermediate step towards new truck design
- Focus on after-market to have a stylish safety device for the truck driver (low price product)



After-market safety bar on a conventional truck (safety & styling)

Demonstration

- Laboratory demonstrator built (steel frame with EPP foam covered)
- Full scale testing with pedestrian dummy

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