Underride Network want list for topics at IIHS Underride Roundtable

April 11, 2016 by Coordinator

IIHS Insurance Institute for Highway Safety

Truck Underride Roundtable

SAVE THE DATE: Thursday, May 5, 2016

Please send us edits or additions for this list.

Vision Zero tells us to design systems for the errant drivers and that each piece of safety hardware must be a part of the whole system. We must not forget that underride guards are a piece of a system and not the whole argument. Underride to the rear of trucks and trailers often involves slow moving, or stopped, or parked vehicles. This means regulating where and how trucks can park or stop. Designing warning systems to increase driver awareness of trucks, increasing brightness and choosing modern fluorescent colors for tape, reflectors, turn signals, and stop lights. We have debated automatic warning flashers when trucks slow to 25 mph or less for slow moving trucks on hills. We need better colors of tape to increase daytime conspicuity and to reduce night-time red dot confusion with other tail lights. Truck tape and tail lights can lose 90% of efficiency when they have invisible road film on them, they must be cleaned regularly, and roadside inspections should include clean tape and lights. Truck and trailer reflectors and turn signals are usually low and smaller than on cars; reflectors, stop lights, and turn signals should be bigger and brighter.

We need to enforce truck parking laws and after 20 years bring back safety education on how and where to park trucks safely. Park on low speed roads, do not park on ramps, use rest areas and truck stops and motels. Require truckers to include truck parking locations in their pre-trip planning. We need reflectors on the side of trailers to warn motorists of the hidden obstacle when trucks cross lanes. We must enforce triangle use including for sleeping truckers, illegal parking is far more dangerous than fatigue which mostly kills truckers in drive off the road single vehicle crashes. We would like to see solar LED lights to light trucks when they are parked. Flashing solar lights might improve triangles visibility. Campaign for more publication of rest areas locations and to build more rest areas. We believe mid-sized companies and larger should be required by law to provide parking when regularly receiving goods or at the very least submit safe parking locations to their shippers.

Vision Zero is not Vision 40%, do not divide victims or only save perceived good victims. All road users are equally worth saving including trucks, cars, buses, motorcycles, bicycles, and pedestrians. Make it clear we want to save even errant victims and be proud of this. We need to design front and side guards to protect all users. Use research already performed such as Rechnitzer G. & Grzebieta R.H., "So you want to increase cycling on roads: then we need side underrun barriers on all trucks".

Recommendations for side guard design are:

APROSYS cheap easy to build reinforced pallet box side guards were tested to 40 mph (64 km/h) successfully, we would like to see a minimum speed of around 30 mph (48 km/h) in an 90 degree crash with a mid-sized car with no PCI.

Lowering the ground clearance to around 350mm.

Flat panel surfaces only, with railings not permitted.

All exposed edges to be radiused (say 20-50mm) to reduce edge loads on unprotected road users.

Can be met by vehicle design or side guards.

Flush with vehicle.

Wheel covers over wheel wells.

OK to integrate vehicle components such as fuel tanks and toolboxes as long as dimensional and strength requirements are met. May not attach other unapproved components to a side guard.

Max. gap longitudinally is 250-500 mm (9.8 -19.7 in.) in front, depending on vehicle type (typically 300 mm (11.8 in.)); for conventional cabs, EU max forward gap to cab panel is 100 mm (3.9 in.); in rear, max 300 mm (11.8 in.)

Current Volpe strength standards must be banned as discriminatory 1 kN (220 lbs.)

Energy absorption: 20 kJ minimum (Starting point for engineers, to be decided)?

Strength minimum 100 kN (Starting point for engineers, to be decided)?

Must be free of projections.

Exemptions: most buses and car-carriers would not need side guards due to vehicle designs' low ground clearance.

Spray Suppression.

Recommendations for front guard design are:

Front guards must have 3 levels of resistance; soft front for pedestrians and cyclists, middle area must be softer than the partner vehicle in crashes and able to absorb energy such as through crush, and rear area must be strong and stiff enough to resist underride and rotate high-speed vehicles away from the truck. We must extend the front guard from the truck probably 600 mm (2 feet) to give room for an 500 mm (1.6 feet) radius curve to deflect crash partners including VRU and cars. The extra 600 mm should give us 102 km/h or (63 mph) of protection which would exceed a general goal of 60 mph (100 km/h) which is an average speed for highway crashes in the real world.

Pedestrian nosecone

Energy absorption: 100 kJ minimum (Engineers decide, additive speed maybe double rear requirement?)

Strength minimum 200 kN 400 kN 200 kN Stronger rear structure behind softened front structure (Engineers decide, additive speed maybe double rear requirement?)

VC-Compat: the force generated by the car in an offset configuration crash is between 200 and 300 kN.

Require extending guard from truck minimum 600 mm (Increase stroke for energy absorption and allow room for curved guard).

Increasing the length of the HC (HoneyComb shaped front nose underrun guard) increases the critical impact speed To 95 km/h (59 mph) with a 300 mm – length HC structure (+27%).

Scania has presented a project in 2003 with an increased front nose of 600 mm (and 250kg) that was said to be able to increase the critical impact speed from 56 to 80 km/h in a frontal car to truck crash. Scania has estimated that this speed increase could save 900 lives a year in Europe.

The advantage of a longer structure is not only that it can absorb more energy but it also reduces the optimum stiffness which protects smaller cars and it is important that the truck is not stiffer than the car

as the crush would occur first to the weaker crumple zone and the truck nose must deform before the car to maintain advantages of the increased energy absorption.

Require the guard to be curved with a radius of 500 mm and sloped to direct cars and pedestrians away from truck. The aim would be to provide a glance-off effect for small overlaps in compromise with a good energy absorption for big overlaps.

Soften front to lesson head injuries and increase VRU compatibility.

Height 300 mm.

Wider and lower windscreen to improve direct visibility.

Pedestrian flashing and audible warnings when turning.

Object, vehicle, and pedestrian detection 360 degrees.

Blind spot camera technology along with improved convex mirrors.

Lane tracking.

Parking sensors.

Rear Underride Guards:

Barrier test Forces:

P1 (outer edge) P2 (off centre) P3 (centre)

200 kN 200 kN 100 kN

Barrier height: 400mm

Barrier width: Within 100mm of the outer frame of the rear of the truck.

Energy absorption: 50kJ minimum.

Barrier equal with rear plane of truck or extending outward from this plane.

Extend P1 test location out from center as IIHS recommends.

Reinforced angled struts out to ends of guard for offset impacts.

Stop exemption for wheels back trailers. Flat plane and energy absorption.

Meet IIHS recommendations to require guards to be certified while attached to complete trailers, and that at a minimum, guards should be tested while attached to sections of the trailer rear that include all

the major structural components and that are constrained such that the load paths near the guard are not changed.

Rear guards should be mounted within 12 inches of the rear plane of any aerodynamic fairings in the rear of the truck or trailer.

We have been dealing with Clinton Era rear underride guards from the 1990's to the present day that only protect cars in crashes from 25 to 30 mph. The U.S. federal government deliberately crash tested guards at or near 30 mph to hide the catastrophic outcomes of most crashes occurring at highway speeds of 50 mph and more. Thousands have died that existing better guards could have saved. We now have no federal regulation of big rig parking on Interstate Highways. They seem to leave regulation and enforcement to the entities that maintain and enforce regulations on each stretch of roadway, i.e. the states. It has been known that many people dying on highways in truck crashes died in crashes with parked trucks on shoulders. States like Kentucky ban parked trucks on the shoulders of Interstates but many do not, and most states publicly boast their state police do not or will not enforce such laws. We believe that parking on highway shoulders is just as lethal if not more so than drinking and driving and under Vision Zero seeing safety as a complete system you must include saving lives by banning non-emergency Interstate Highway parking of big rigs at the national level under Interstate Commerce laws. It must not be just high-speed underride guards, it must be a total effort to decrease deaths and serious injuries and shame on all of us for letting people die when we knew what efforts were needed to save lives since the 1950's.

Other Underride Related:

Driver drowsiness sensors improve the active safety.

Lighten truck and frame to reduce mass mismatch.

Improved fuel tanks fire and leak protection.

Better Fire extinguisher and crowbar, visible and accessible by public for crash fire suppression and victim rescue.

No external surface of the vehicle may exhibit a part likely to catch or injure pedestrians, cyclists or motor cyclists.

The vision on the passenger's side and on the driver's side is ensured by mandatory Class II and Class IV mirrors on both sides. A close-proximity mirror (class V) on the passenger side is compulsory. It must be fixed at least 2 m above the ground. A class V mirror on the driver side can be used as an option. The first-time prescribed front mirror (class VI) enables the driver to see the area directly in front of the

vehicle to improve the visibility of pedestrians and cyclists. As a result the danger zone can now be seen indirectly by the driver.

NCAP type testing of underride guards and publishing results.

Requiring some sort of Vision Zero test for safety regulations such as reducing all injuries for all groups for intended purpose as opposed cost benefit.

The Underride Network supports a similar criteria for underride guard crash tests as those submitted by Prof. Raphael Grzebieta and (Adj) Associate Professor George Rechnitzer and Transport and Road Safety (TARS) Research Centre in Australia based on the criteria used for MASH crash tests in the AASHTO Manual. We would submit requiring multiple speed tests to include real world crash speeds and would not limit extension of guards to increase crush or stroke distance to increase guards effective speed while diminishing deceleration forces. Tests might be performed at 44 mph and 50 mph and 62.2 mph to test minimally compliant guards in low-speed test and using higher speed tests to monitor performance at real world crash speeds. We support testing for Practical Worst Case (PWC) scenario crashes that happen in the real world just as MASH includes PWC in it's crash test series. We must include tests of offset controlled after crash direction of vehicle spin or VRU (Vulnerable Road User or bikes and pedestrians) after crash spin to assess high-speed crash avoidance for cars and prevention of running over VRU users in frontal crashes. John E. Tomassoni "It is expected that certain offset conditions could result in car rotation such that the passenger compartment may beneficially avoid intrusion entirely".

Victims are mostly interested in high-speed crash protection so successful MASH crash tests with no PCI while meeting energy absorption requirements would be a possible scheme for regulation. This might work for rear and side guards but front guards will require more regulation.