



EXCHANGE OF EXPERIENCE

ESTIMATION OF THE NEED FOR HARMONIZATION OF TECHNICAL DEMANDS FOR VEHICLES USED IN TRANSIT COUNTRIES TO DECREASE THREATS MADE BY THE ACCIDENTS, PRESENTED IN THE SELECTED EXAMPLES

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**Abstract.** The paper shows the need to make harmonization of the technical demands concerning the vehicles used in the traffic. The vehicles moving now on the roads in the transit countries were allowed to be driven according to demands which were milder than the present binding ones. Some rules were changed because the performing technical progress and development of the devices allowed sharpening the demands for the new registered vehicles in order to decrease the number of accidents. It results from the fact that earlier registered vehicles are more susceptible to accidents. The analysis of this problem was presented in 4 selected cases connected with the safety of participants in the traffic. The paper also discusses the need to equip the trucks already used in Poland with the devices of indirect visibility which enable to observe a much bigger area in the neighbourhood of the vehicle. Increase of indirect visibility from the driver's seat improves the safety system of the participants in the road traffic. Application of the demands of the Directive 2003/97 (which is obligatory for the newly produced vehicles) to the vehicles earlier registered can be done by replacement and installment of the new mirrors which contain the bigger areas. The solution to the problem of the limited visibility at the inclined crossing of roads and enlarged crossing by turn to the left is proposed.

**Keywords:** safety, transport, visibility.

## 1. Introduction

“A large number of accidents are caused by drivers of larger vehicles who are not aware that other road users are very close to or beside their own vehicle. These accidents are often related to a change of direction at crossings, junctions or roundabouts, when drivers fail to detect other road users in the blind spots, which exist in the area immediately around their vehicles.

It is estimated that every year, over 400 people lose their lives in the European Union because of these accidents. Most of the victims of such accidents are pedestrians or two-wheelers, a particularly vulnerable category of road users.

The European legislation has been attentive to this problem. In 2003, the European Parliament and the Council adopted Directive 2003/97/EC on the approximation of the laws of the Member States relating to the type-approval of devices for indirect visibility and of vehicles equipped with these devices. According to this Directive, in 2006 new vehicle types and respectively in 2007

new vehicles can only be granted approval by the Member States' authorities if they are equipped with a set of mirrors and other systems of indirect visibility fulfilling certain requirements in order to reduce their blind spots.

While this legislation is clearly beneficial, existing trucks are not covered by it. Given the lifetime of heavy goods vehicles (HGV), the effect of the new legislation is therefore quite limited for a long period of time. This means that the HGV fleet will be completely exchanged in about 16 years, i.e. in 2022 at the earliest.

Given this slow replacement rate, the blind spot problem remains relevant for a long period of time, until the vast majority of vehicles still equipped with less performing systems for indirect visibility will be withdrawn from circulation after 2020. If nothing is done, the high risk to vulnerable road users of being involved in accidents with HGV due to their lateral blind spots, above all on the passenger's side, is thus bound to continue for many years.

**2. Improvement of the safety system by the increase of indirect visibility in the trucks used in Poland**

The author of this paper was researching (among others) the dependence of minimal width and minimal height on the radius of curvature of mirror (mirror class IV – wide angle). There exists also dependence upon height of fitting the mirror over the ground (Fig. 1). Mirrors class IV (wide angle) after the modification are giving too small observation area. It is enough for the HGV driver to ob-

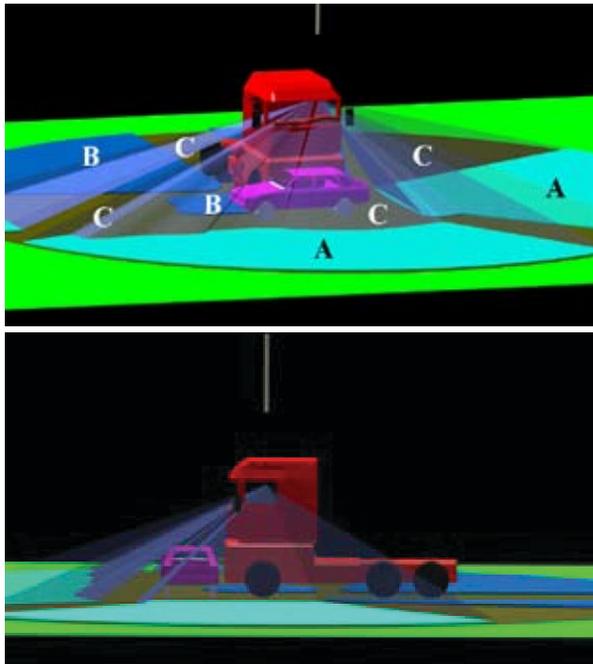


Fig. 1. Scheme of invisible area around the truck

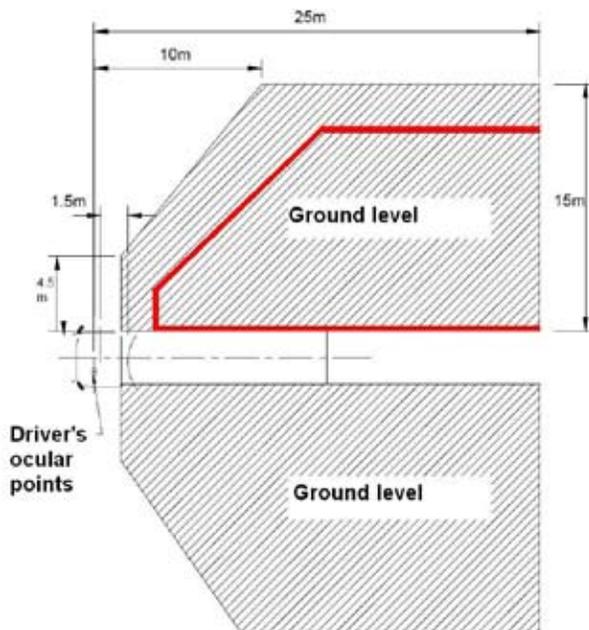


Fig. 2. Placement and vastness of visibility fields for wide-angle mirrors of class IV for certain vehicles' categories and mentioned cases in the directive - hitherto demand was marked by thickened line

serve the pedestrians, motor bikers, motorcyclists during his turn into the right (Fig. 2). At angular intersections the HGV driver is not still able to observe other vehicles from the far distance which are coming from the right side (Fig. 3). This problem should be in future resolved for new and used HGV. The idea of increasing the observation area in wide-angle mirrors (class IV) is not resolving the invisibility of vehicles coming from the right side (from the far distance) at the angular intersection (Fig. 4) and during turning into the left side at the big perpendicular intersection (Fig. 5). The lack of visibility in these mentioned situations leads to possible accidents on roads in Poland.

One of the methods of dealing with this problem is placing an additional, accurate mirror – class IV (wide angle) fitted in the cab of HGV (Fig. 6). It should allow observing invisible area from the right side from the distance not smaller than 150 m.

A different way of dealing with this problem is placing a big, wide-angle mirror at the angular intersection where the lack of visibility appears (Fig. 7). It should allow the driver to observe invisible area from the right side of the truck, which has not any additional mirrors fitted.

Another problematic situation: when a car is drawing alongside a trailer which is wider than the car itself, without any additional mirrors placed in the way

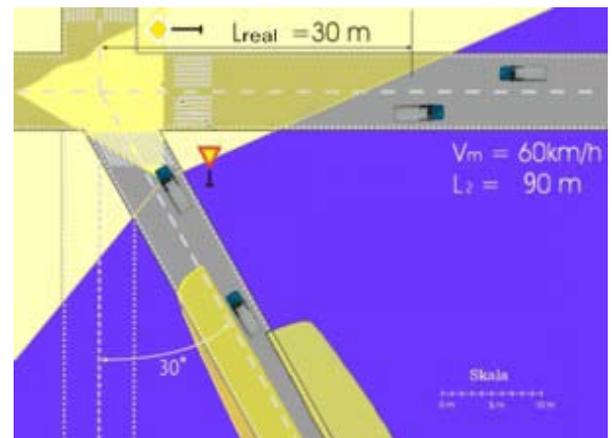


Fig. 3. Approach – stop situation at the angular intersection



Fig. 4. View of the big angular intersection



Fig. 5. View of the big perpendicular intersection



Fig. 6. Extra-spherical mirror in the vehicle cab



Fig. 7. View of mirror placement on the road with the lack of visibility

that they reach out from the outline of a trailer. In some countries it is obligatory for the car which is drawing alongside a wider trailer to have additional mirrors. A wider trailer limits visibility for the car which has standard equipment, this can lead to the increase of the possibility of accident occurrence (Fig. 8).

Succeeding issue: a tip-truck without the rear bumper. This problem occurs in case of self-unloading



Fig. 8. View of the wide trailer (drawing alongside a car) with invisible (covered by the trailer) mirrors



Fig. 9. Simulation of the possible accident between tip-truck (without the rear bumper) and bus or van



Fig. 10. View of the bus with side marker lights overnight

trucks – which were excused from having a rear bumper. When the unloading case is extremely sticking out in the tail-board of the car, the threat of heavier accident occurs in case of a tail-board crush for the vehicles in category N2, N3, M2 and M3.

Fig. 9 shows what is going to happen when a bus or a van is going to run into the tail-board of a tip-truck. Side marker lights of the bus overnight – result of applying this equipment to the long vehicle as shown in Fig. 10.

In prior regulations there was no necessity to equip the vehicles longer than 6 m with side yellow positioning lights (active and passive). Overnight, it is quite hard to notice such a vehicle and often they are noticed too late, however they are used on public roads.

### 3. Conclusions

In this paper the need to equip the trucks already used in Poland with the devices of the indirect visibility is discussed allowing to observe a much bigger area in the neighbourhood of the vehicle. Increase of indirect visibility from the driver's seat improves the safety system of the participants in the road traffic.

Application of the demands of the Directive 2003/97 (which is obligatory for the newly produced vehicles) to the vehicles earlier registered can be done by replacement and installment of the new mirrors which contain the bigger areas. The solution to the problem of the limited visibility at the inclined crossing of roads and enlarged crossing by turn to the left is proposed. In Poland, about 40% of total amount of HGV used nowadays were produced before 1998.

That means that these HGV are going to be excluded from retrofitting with mirrors: class IV (wide angle), class V (close proximity), which are in accordance, in

discussed areas, with the new UE Directive 2003/97. In Poland there is an important need for retrofitting these HGV (produced before 1998) – the Polish Government should take this into consideration. Also Polish mirror producers should have an opportunity to incorporate the procedure of the UE Directive 2003/97 into their production processes. Particularly it is important because of a special characteristic of older HGV used in Poland – different than in other UE member states. In like manner it is necessary to implement for cars drawing alongside a wide trailer, tip-trucks without rear bumper and vehicles without side marker lights, changes in the equipment. Introduced issues are carrying weight to safety of traffic participants. Furthermore, the differences in technical requirements for motor transport applied in particular transit countries are preceding a problematic issue, which should be defined and researched.

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