

WAYS OF IMPROOVING CAR SAFETY IN THE EU TROUGH REGULATION

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Summary: Road safety in the EU has improved significantly over the past decades, thanks to effective action taken at EU and national level to address road user behaviour, vehicles and infrastructure. As a result the EU roads are the safest world-wide. This increased safety can, to a large extent, be attributed to legislative requirements on safety of vehicles that have been introduced to road safety. The EU has, in the past, introduced mandatory fitting of electronic stability control systems on all vehicles and advanced emergency braking systems and lane departure warning systems on trucks and buses, which contribute to the reduction of fatal casualties in traffic by an estimated 5,000 a year. The full potential of these and further active safety technologies can only become reality with large-scale deployment in vehicles on EU roads. The aim of this paper provides a comprehensive overview and proposes a way forward as regards improved vehicle safety for the benefit of all road users, that is to say, all citizens of the European Union.

Key words: Active Safety, Intelligent Transport Systems, Intelligent Vehicle, Intelligent Vehicle Safety Systems, Passive Safety, Present Vehicle Safety Regulation, Regulation, Vehicle Safety

INTRODUCTION

We are still far from meeting the target of halving the number of road accident victims by 2020 and achieving the Vision Zero goal of no road fatalities in Europe by 2050. It is true that we are on the right track. Europe's roads have not only become safer, they have long been the safest in the world! Nevertheless, around 25 500 people die on Europe's roads every year and some 135 000 people are seriously injured (1).

Given that road safety depends on the vehicle, the infrastructure and the driver, efficient active and passive safety measures are needed at all three levels.

The most common cause of road accidents is the reduction in driver's attention due to fatigue or simply because the driver's negligence due to other tasks such as tuning the radio, phone use and communication with traveling companions. Using qualified estimate it can be assumed that with the application of "intelligent" systems in vehicles, over 50% of human lives could be saved. In recent years the most attention was given to improving the

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passive safety of vehicles, making vehicles of today four times safer than they were in the 1970s (2).

Vehicle safety is also an element of competitiveness; therefore vehicle manufacturers are paying increased attention to this issue when developing new cars. The modern car is designed with particular emphasis to ensure a high level of safety of passengers and other road users. To ensure a high level of security, vehicles are fitted with systems that support certain conducting activities, and in some cases they can replace the driver, for example in a traffic accident the system could report the location of the vehicle and call for help (eCall). Progress in measurement techniques and information systems opened up new possibilities for automation of the vehicle control process. It is now technically possible to build fully automated vehicles, but the user problems arise from the technical difficulties that have arisen in the course of testing in urban conditions and also the applicable laws that fail to address the legal responsibility for driving intelligent vehicle without a driver and causing an accident.

1. SAFETY OF VEHICLES DUE TO REGULATION

Over the past 15 years, some vehicle safety requirements have been introduced as mandatory. The protection of passenger cars during front and rear impact, as well as pedestrian protection, was considered to be key in terms of regulatory intervention in vehicle safety (3). This action has contributed to reduction of the number of traffic accidents and deaths / injuries, making the EU the safest region in the world in terms of vehicle safety.

Comparison of the EU situation in 2013 with that of 2004 as regards the number of fatalities of pedestrians and bicyclists, demonstrates a 37% and 32% reduction of fatalities respectively (4).

The General Safety Regulation has introduced mandatory driver safety belt reminder, ISOFIX connectors to safely attach child seats in cars, and tyre-pressure monitoring to prevent car tyre blow-outs that can lead to loss of control. Lane departure warning and autonomous emergency braking were made mandatory for new trucks and buses and electronic stability control systems and daytime running lamps were introduced for all motor-vehicles.

2. VOLUNTARY FITMENT OF NEW TECHNOLOGIES

When developing new vehicles it is emphasised that the vehicle meets the safety requirements. These requirements are set by valid regulatory acts, but also by customer's needs. In addition, vehicle manufacturers themselves are developing a variety of safety features that are intended to increase the safety of the vehicle. The main purpose of vehicle safety is life and health of the vehicle crew, but also other road users (pedestrians, cyclists, other vehicles, etc.). In general, the goal is to minimize the likelihood of an accident and if this occurs, to ensure protection of health and life. To achieve this goal it is possible to apply different features that can be called safety of the vehicle.

Consumer car assessment and rating programmes have encouraged vehicle manufacturers to develop vehicles that are safer than required by the EU vehicle safety legislation and to fit state-of-the-art advanced safety technologies to an extensive portion of their models on the market. It is without a doubt that these efforts are also contributing to the high level of safety on EU roads.

Such a consumer assessment and rating program for cars is, for example the European New Car Assessment Programme (Euro NCAP). Euro NCAP is a voluntary European car safety performance assessment program backed by the European Commission and several European governments, as well as by motoring and consumer organisations. Euro NCAP publishes safety reports on new cars, awarding 'star ratings' based on the performance of the vehicles in a variety of crash tests, including front, side and pole impacts, and impacts with pedestrians. The top rating is five stars (5).

However, whereas manufacturers in general would strive to obtain the highest possible star rating for their top selling models in key Member State markets, there are indications that not all countries receive an equal distribution of high-ranked cars in their respective markets. In some cases specific low-ranked models are specifically targeted for certain (less affluent) markets and not available in the others. In other cases the normally high-ranked models will actually perform less well in real life, because they are stripped of the non-mandatory advanced safety features in specific countries, for instance for reasons of cost reduction linked to local taxation policies. This common practice can be explained because of the (up to recently) used rating scheme rule that not all, but only a majority of rated cars sold should be fitted with a given safety feature.

As a result of the above, there are clear indications that not all EU citizens have access to cars with an equal high level of safety depending on the internal policies and allocation strategies of vehicle manufacturers and their importers, notably in what regards the purchase power of the consumers in a specific market, leading to the situation that one out of every five cars bought does not necessarily have the advanced safety features on board which the star rating would imply. Still, many of the features promoted by the rating programmes are commonplace and, due to economies of scale, their cost should have fallen considerably over the past years. Making these features mandatory could help making the protection levels more even.

3. POSSIBLE ASSESSMENT OF THE PRESENT VEHICLE SAFETY REGULATION

To allow for a more ambitious and harmonised safety situation in the whole of the EU, the review of EU vehicle safety regulations should assess the safety features envisaged for possible mandatory inclusion to achieve an improvement of the level of safety of vehicles towards the level that is consistent with the current baseline offered by mainstream best-selling cars in the EU.

Regarding commercial vehicles and buses, the situation also requires attention. Whereas for passenger cars the focus is on the protection of the occupants and on protection of pedestrians and other vulnerable road users, this is not always evident for the other vehicle

categories. Although elementary safety features such as general construction integrity and safety belts, as well as autonomous braking and lane departure warning systems are now required, relatively little attention has been given to further promote and improve the levels of safety offered by these vehicles. This is in conflict with a need to better protect the occupants of such vehicles given their still significant share of casualties, and to protect bicyclists and pedestrians that are increasingly involved in accidents leading to severe injuries and deaths in EU cities.

In light of regulatory actions in other regions of the world, notably that of the USA and Japan, it is appropriate to initiate studies to investigate the specific accident types that are addressed in those regions with the aim to confirm whether or not similar occurrences in the EU needs attention. Such studies are to obtain an up-to-date overview for the EU situation and to identify countermeasures that may need to be taken. These accidents could concern frontal crashes, side crashes, roll-over accidents and rear crashes, notably with a focus on the effects due to the proliferation of SUVs with higher centres of gravity, higher masses and aggressive front-end design, linked to injuries to diverse and vulnerable occupants as well as to vehicle fires resulting from crashes.

4. THE NEED FOR IMPROVEMENT OF DETAILED INFORMATION ABOUT TRAFFIC ACCIDENTS

For every person killed in traffic crashes, many more suffer serious injuries with life-changing consequences. The serious injuries are not only more common but also often more costly to the society because of long-time rehabilitation and healthcare needs.

Central to the strategy of casualty reduction is the requirement for good quality in depth accident data. Such data is seen as a fundamental pre-requisite for the formulation and monitoring of road safety policy in the EU. Data is needed to assess the performance of road and vehicle safety and to support the development of further actions. It has already been identified many years ago that no single accident database available in the EU so far could meet all the needs and that there are major gaps, including regarding in depth accident and injury causation.

Further revisions of vehicle safety rules, as well as any other road safety measures, would benefit from a wider availability of accurate EU-wide in depth accident data.

5. SUGGESTIONS FOR FUTURE REGULATIONS IN THE FIELD OF VEHICLE SAFETY

The automotive industry continues to innovate and the regulatory requirements need to be re-visited, with the aim to ensure that the EU continues to be in the fore-front of international developments, while continuing the work for saving lives. The impressive progress in the reduction of car accidents has slowed down lately, while the cost of road fatalities and injuries is estimated to be at least €100 billion a year and hundreds of families continue to be shattered every year due to road accidents (6).

Active safety features and their technological development are leading to gradual automation of vehicles. They are considered as key enabling technologies to boost and support the wider automation of vehicles, contributing to the digitalisation of the internal market. The EU has, in the past, introduced mandatory fitting of electronic stability control systems on all vehicles and advanced emergency braking systems and lane departure warning systems on trucks and buses, which contribute to the reduction of fatal casualties in traffic.

Several of these requirements also contributed to the reduction of CO₂ emissions and therefore to comply with the EU targets on climate action and to the objectives of the energy Union. This was the case for tyre pressure monitoring systems for passenger cars that ensured use with optimal tyre pressures to reduce the rolling resistance and therefore reduce fuel consumption. The climate action targets for reducing CO₂ in the transport sector also call for development of further vehicle technologies that incentivise driving in optimal conditions of fuel economy, e.g. through adaptive and intelligent speed adaptation and expansion of tyre pressure monitoring to commercial vehicles.

With increasing levels of vehicle autonomy being a priority for car manufacturers, accurate, robust, durable and affordable sensor technologies are becoming widely available. These are necessary to fully detect the environment around the vehicle, contributing to safety, especially regarding vulnerable road users, and to the reduction of congestion and the ensuing pollution, given that 15% of all congestion in Europe is due to accidents (7).

In the field of vehicle safety, specific measures should be adopted in four main areas of action. In any case, these proposed measures are feasible but should carry out further studies as to whether they are cost-effective.

A. Active safety measures

This main area covers measures that have the ability to avoid accidents altogether rather than to mitigate their outcome and is generally considered the most important area of future vehicle safety legislative advancement. The safety features covered are:

- automatic emergency braking,
- intelligent speed adaptation,
- lane keep assistance and
- driver drowsiness and distraction monitoring.

B. Passive safety measures

This area covers accident mitigation measures consisting of introduction of new requirements or enhancing of existing measures in the field of:

- emergency braking display (flashing stop lamps),
- seat belt reminder,
- frontal crash testing,
- side crash testing,
- rear crash testing,
- alcohol interlock device interface standardisation,
- crash event data recorder and
- tyre pressure monitoring.

C. Measures for trucks and buses

The measures under consideration to improve the safety of trucks and buses are the introduction or improvement of:

- front-end design and direct vision,
- truck and trailer rear underrun protection (rear bumper),
- lateral protection (side guards) and
- fire safety for buses.

D. Measures for pedestrian and cyclist safety

Finally, this area foresees

- the introduction of pedestrian and cyclist detection (linked to automatic emergency braking systems),
- head impact protection on A-pillars and front windscreen,
- reversing (backing up) detection of persons behind vehicles.

CONCLUSION

Vehicle safety rules in force in the European Union today consist of a comprehensive package with proven effectiveness and track record. Motor vehicle legislation is in fact a critical area in terms of impact on the reduction of casualties. This article proposes a comprehensive overview of the measures that should be taken to improve vehicle safety for the benefit of all road users.

Any new requirements on safety of vehicles for European roads should spur further innovation and investment to create quality jobs in the EU and bolster the competitiveness of EU industries. They should also reinforce the Union's commitment to deliver robust reductions in greenhouse gas emissions as part of the strategy to combat climate change.

Virtually all manufacturers now offer driver assistance packages and around a quarter of all new cars are equipped with one or more driver assistance systems, but conversely this means that three quarters of vehicles do not have any driver assistance systems apart from those prescribed by law. The reason is no doubt the extra cost of driver assistance systems. As a matter of principle, road safety should not depend on EU citizens' wallets.

Arguments to the effect that the price of new vehicles will shoot up as a result of the mandatory installation of driver assistance systems can be countered by the fact that the bundling of technologies, such as the simultaneous use of cameras for intelligent assistance to indicate speed limits and for lane keeping assistance, combined with the high volume of components produced, means that prices will not increase significantly.

In addition, we can shape legislation wisely by ensuring that it lays down specific rules and timeframes that will make realistic implementation possible and thus provide planning certainty for the industry. This, however, is a task that should be carried out as part of the revision of the legislation itself, and these specific rules therefore fall outside the scope of this own-initiative report.

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