

Intelligent Speed Assistance (ISA)

Board resolution taken on 06th November 2018 based on the recommendation the Executive Committee Vehicle Engineering

Explanation

Excessive and above all inappropriate speeds are the essential causes of road accidents throughout Europe. Driver assistance systems to assist drivers in their choice of speed have been the subject of discussion for a long time. They have developed from systems which cannot be bypassed by the driver to the assistance systems which can be bypassed, as now proposed in the General Safety Regulation (GSR). Investigations have shown that intervening systems are the most effective systems with regard to accidents, but would have considerably less acceptance by users¹.

Accident figures: accident database of the German insurers (UDB)

Evaluation of the UDB clearly shows that inappropriate speed is stated by the police as a considerably more frequent cause of accidents than exceeding the maximum speed limit. This applies for all types of road users. The data in the following table takes into account "speed" as the cause of accidents as it is recorded by the police.

¹ Carsten, O., Lei, F., Chorlton, K., Goodman, P., Carslaw, D., Hess, St.: Speed Limit Adherence and its Effect on Road Safety and Climate Change. Final Report, University of Leeds, October 2008.

| Accident Causes VUA [accident recording] (01-69) | Responsible for accident | | | | | |
|--|--------------------------|-------------|---------------|-------------|-----|-------------|
| | Car/van | | Goods vehicle | | Bus | |
| | n | % | n | % | n | % |
| | 3941 | 100 | 884 | 100 | 334 | 100 |
| Exceeding the maximum permissible speed | 40 | 1.0 | 21 | 2.4 | 1 | 0.3 |
| Inappropriate speed in other cases | 502 | 12.7 | 121 | 13.7 | 48 | 14.4 |

Source: UDB (accident database of German insurers), motor vehicle liability damage with claims of at least € 15,000 and personal injury

In-depth analysis shows that for the accident cause "inappropriate speed" for cars, trucks as well as buses, increased effectiveness of ISA systems can mainly be expected outside built-up areas and on motorways. For "exceeding the permissible maximum speed" this is only shown outside built-up areas, without motorways. These statements are also confirmed by analyses of road accident data for 2015 from the federal state of Baden-Württemberg.

| Accident Causes VUA [accident recording] (01-69) | Responsible for accident in built up areas | | | | | |
|--|---|-------------|---------------|-------------|-----|-------------|
| | Car/van | | Goods vehicle | | Bus | |
| | n | % | n | % | n | % |
| | 2314 | 100 | 370 | 100 | 228 | 100 |
| Exceeding the maximum permissible speed | 13 | 0,6 | 7 | 1,9 | 0 | 0,0 |
| Inappropriate speed in other cases | 157 | 6,8 | 32 | 8,6 | 26 | 11,4 |
| Accident Causes VUA [accident recording] (01-69) | Responsible for accident outside built up areas | | | | | |
| | Car/van | | Goods vehicle | | Bus | |
| | n | % | n | % | n | % |
| | 1213 | 100 | 228 | 100 | 83 | 100 |
| Exceeding the maximum permissible speed | 25 | 2,1 | 6 | 2,6 | 1 | 1,2 |
| Inappropriate speed in other cases | 213 | 17,6 | 29 | 12,7 | 15 | 18,1 |
| Accident Causes VUA [accident recording] (01-69) | Responsible for accident on motorways | | | | | |
| | Car/van | | Goods vehicle | | Bus | |
| | n | % | n | % | n | % |
| | 413 | 100 | 286 | 100 | 23 | 100 |
| Exceeding the maximum permissible speed | 2 | 0,5 | 8 | 2,8 | 0 | 0,0 |
| Inappropriate speed in other cases | 132 | 32,0 | 60 | 21,0 | 7 | 30,4 |

Source: UDB (accident database of German insurers), motor vehicle liability damage with claims of at least € 15,000 and personal injury

An ISA system which was only designed for use outside built-up areas would have the advantage that due to the less complex and more uniform infrastructure, the number of false alarms by the systems – mainly those of the first generation – would be reduced and therefore acceptance by drivers could be increased.

In association with inappropriate speed, evaluations of accidents have shown that mainly curves and the state of the road (e.g. ice, snow, etc.) are the two decisive factors which cause car accidents outside built-up areas.

Potential

According to calculations in the context of the EU cost/benefit assessment, as a system, ISA which influences the driving speed in relation to the permissible maximum speed has the following reduction potential² :

- up to 3.6% of all fatalities,
- up to 2.4% of serious injuries,
- up to 1.6% of slight injuries.

According to ERTICO³ the reduction potential for heavy commercial vehicles is 1% of all accidents and according to a TRL analysis⁴ for the vehicle classes M2/M3/N2/N3 it is

- up to 2.4 % of all fatalities,
- up to 0.32% of serious injuries,
- up to 0.2% of slight injuries.

Furthermore, it is to be expected that a warning that the prescribed speed limit has been exceeded would have a positive effect on overall speed behaviour – including in built-up areas. It is expected that overall, excessive speeds will be reduced by this.

² Hynd, D., McCarthy, M., Carroll, J., Seidl, M., Edwards, M., Visvikis, C., Tress, M., Reed, N. and Stevens, A. (TRL): Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users. Final report, European Commission, Sustainable Growth and EU 2020, 2015.

³ Winder, A.: "ITS4CV" – ITS for Commercial Vehicles. Study of the scope of Intelligent Transport Systems for reducing CO2 emissions and increasing safety of heavy goods vehicles, buses and coaches, final approved version, 9. September 2016, ERTICO-ITS Europe.

⁴ TRL, CEESAR and ACEA: ISA - Intelligent Speed Adaption for M2/N2 & M3/N3 Accident analysis. Joint accident analysis of TRL, CEESAR and ACEA, 2018.

Method of effect:

According to the European Commission ISA systems are driver assistance systems to assist drivers in observing the current speed limits on the section of road which is currently being travelled on. The speed limits are either stored in a digital map in the navigation system and/or are determined by road sign detection. In principle, a differentiation is made between informing, assisting and intervening systems. Over the past decades of discussion, investigations have shown that only assistance systems which can be overridden by drivers have a realistic chance of meaningful implementation to increase road safety.

Furthermore, from the point of view of increasing road safety, it is essentially desirable that ISA systems include an element to assess the "appropriate speed". This can be carried out on the basis of the current traffic situation in the vicinity of the vehicle, the road situation and the road course (curves) as well as the current weather and the state of the road surface.

Challenges

While digital maps can only be updated with great effort with regard to short-term changes to the permitted speed, for example at roadworks, a further challenge is the detection of static road signs (speed limit signs, signs showing the limits of built-up areas and the adaptive display of systems to influence the flow of traffic).

Inadequately certain detection of road signs, especially due to defective or dirty signs as well as additional signs, e.g. speed limits according to time of day, valid section lengths, valid vehicle types or the assignment of the detected signs to the correct traffic lane are also challenges.

In addition, road signs are not harmonised throughout Europe. This especially applies to supplementary signs. Therefore, even in the years to come, drivers will remain necessary at the decision-making level, e.g. in order to interpret signs which are incorrectly installed, illegible or have been forgotten at cleared roadworks. Solely digital interpretation by the ISA system can create new accident hazards.

In association with the revision of the General Safety Regulation, the European Commission has also revised the infrastructure directive, which has the aim of specifying minimum standards for lane markings

and road signs in order to facilitate the introduction of cooperative, networked and automated mobility systems (e.g. ISA)⁵.

Acceptance

In order to have a high level of user acceptance, the error rate of the systems must be very low. This is the only way to achieve the desired effect on the number of accidents.

For intelligent speed assistants, above all, up-to-date and accurate map data is essential. The correctness of road signs and their cancellation must be reliable. Road signs must also be visible in bad weather conditions.

The acceptance of speed assistants also reduces if they record the driving speeds, communicate these to third parties or can be read out for traffic control purposes.

Legislation and consumer protection:

In the context of the revision of the General Safety Regulation (GSR) the EU Commission requires an assisting ISA system which can be overridden by the driver for all category M and N vehicles as of 2022/2024 (new types/all vehicles)⁶. The system shall have the following minimum specifications:

- "a) it shall be possible for the driver to feel through the accelerator pedal that the applicable speed limit is reached or exceeded.
- b) it shall not be possible to switch off or suppress the system.
- c) it shall be possible for the driver to override the system's prompted⁷ vehicle speed smoothly through normal operation of the accelerator pedal without need for kick-down.
- d) where a cruise control system is engaged, the intelligent speed assistance system must automatically adapt to any lower speed limit."

⁵ COM(2018) 274 final: Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2008/96/EC on road infrastructure safety management, 17.05.2018, Brussels.

⁶ Publication 186/18; Proposal for a regulation of the European Parliament and of the Council on type-approval requirements for motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles as regards their general safety and the protection of vehicle occupants and unprotected road users, amending Regulations (EU) 2018/ ... and repealing Regulation (EC) No. 78/2009, (EC) No. 79/2009 and (EC) No. 661/2009 Brussels, 17.5.2018 COM(2018) 286 final.

⁷ The English version states "...the system's prompted vehicle speed...". Instead of the "prompted vehicle speed", the "detected vehicle speed" would be more suitable.

The consumer protection test EuroNCAP praises special types of ISA systems. These represent the current state-of-the-art. However, it requires only few additional relevant signs to be recognised in Europe.

Explanation of the DVR position:

If the accelerator pedal is not actuated, e.g. when travelling downhill or with a so-called "coasting function" (freewheeling), this signal cannot be detected. As vehicle regulations normally contain regulations with regard to effect and not design regulations, a tactile accelerator pedal should not be prescribed as the sole technical solution. Because of this, the DVR suggests the use of a suitable attention-gaining human-machine interface, including in commercial vehicles. Further investigations are required for this.

Acceptance problems due to unwarranted warning signals (e.g. "continuous beeping" or "continuous vibration") must be avoided. These should therefore be able to be deactivated or suppressed according to the situation. The display of the maximum permissible speed with is detected by the system should not be able to be switched off. Furthermore, the driver can override the system at any time.

Resolution

- The DVR accepts the requirement of the EU Commission to prescribe the mandatory equipment with overridable assisting ISA systems, which address the exceeding of the maximum permissible speed for all vehicles (Class M and N).
- It must be made clear to drivers by means of a suitable attention-gaining human-machine interface, that the applicable speed limit has been exceeded.
- Warning signals as the human-machine interface should be able to be deactivated or suppressed according to the situation. The visual display of the maximum permissible speed with is detected by the system should not be able to be switched off.

- If a speed controller is activated, with adequately certain detection of the applicable speed limit for the vehicle, the vehicle should adapt its speed if this is lower than the preselected speed of the speed controller.
- The driver must be able to override the system at any time. It must for example be possible to easily cancel the required speed of the vehicle by normal actuation of the pedal, without the necessity for a kick-down.
- Driver acceptance will be aided by a low error rate for the systems. For this, infrastructure measures are essential:
 - Road signs should be as uniform as possible throughout Europe and should be uniformly, clearly and visibly installed.
 - Temporarily installed road signs, e.g. in the area of roadworks must be coordinated and must be reliably removed after the completion of the relevant measure.
 - Cancellation of the speed restriction must be displayed.
- To further increase the effectiveness of the systems, the DVR recommends that the systems are further developed so that they can also address inappropriate speed as the more significant cause of accidents.

Signed

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President