

Seat belt reminders

Summary

Seat belts are an effective way of reducing the number of road deaths and severely injured in crashes. Seat belt reminders warn car drivers and passengers if the seat belt is not fastened. This can be done by a visual signal or an acoustic signal or by a combination of the two. Seat belt reminders are becoming more and more intelligent. Not only are they capable of ascertaining whether or not a seat is occupied, they now also take the driving speed and the distance travelled into account. The systems with a persistent and penetrating sound are most effective. On European level large safety gains could be achieved if all car occupants in all the Member States were to use a seat belt. Since 2002, EuroNCAP has awarded points for the driver seat being equipped with a seat belt reminder and since 2009 an extra point is given for each additional seat with a reminder. The EU is expected to decide to make seat belt reminders compulsory for passenger cars, and, in the somewhat longer term, also for other vehicle categories.

Background and content

Seat belts are a very effective way of limiting physical injury in a road crash. Wearing a seat belt is compulsory in the Netherlands; by far the most car occupants therefore wear seat belts. The annual data of the Ministry of Transport indicate that in 2008 95% of those sitting in front and 80% of those sitting in the rear wear a seat belt (DVS, 2008; SWOV Fact sheet [Seat belts and child restraint seats](#)). A seat belt reminder or SBR gives a warning if car occupants do not wear a seat belt when the car is in motion. In a more or less penetrating manner they are reminded that the seat belt must be worn. This fact sheet discusses the different types of seat belt reminders, how they work, what effect they have on seat belt use, how often they are present in cars, and whether or not they are accepted.

How do seat belt reminders generally work?

Initially only the driver seat was equipped with a seat belt reminder, then the passenger seat followed, and now there are vehicles that have seat belt reminders for all seats.

The reminder or warning system can consist of a visual signal (a blinking icon or text display) or an acoustic signal of varying pitch. A combination of both signal types is used for the front seat belts, whereas only a visual signal is given for the rear seat belts. The warning signal switches off when the seat belt clip is fastened.

In the US, visual and auditive warning systems are used that warn for more than 8 seconds. This type of system is called an Enhanced Seat Belt Reminder (ESBR; Farmer & Wells, 2009)

There are also systems that check whether a seat in the car is occupied and only warn if this is indeed the case. Of course this is only relevant for the passenger seats. Furthermore, these more intelligent seat belt reminders only warn when it is relevant given the use of the vehicle, e.g. when a certain driving speed or distance is exceeded. This is done to avoid unnecessary hinder from the seat belt reminder when wearing a seat belt is less urgent, for example, when making a parking manoeuvre.

When was the seat belt reminder first introduced?

As early as 1973 a first attempt was made in the United States to stimulate the use of seat belts by making interlock systems in new cars compulsory. Such a system meant that the car could only be started if all those sitting in the front seats had their seat belt on. The public reacted extremely angrily at such a 'restrictive' system, and within a year it was no longer compulsory. In spite of this, a few car brands made a seat belt reminder a standard accessory, but only as a system that reminds the occupants in front to wear their seat belts in a friendly way.

It was not until the mid-1990s that stimulating seat belt use with seat belt reminders was tackled seriously. This happened as a result of publications of the research department of the Swedish insurance company Folksam, and the founding of a Swedish working group that formulated requirements for a well-functioning seat belt reminder. In the late 1990s, Saab and Ford introduced systems which were based on these requirements. One of the characteristics was that the warning became more penetrating the longer the seat belt hadn't been worn. Another feature was that their

system only worked when the car went faster than 15 km/h. The car manufacturers were rather careful in the seat belt reminder version they sold because they did not want to hinder their customers' car use unnecessarily.

What are the recent developments?

Early in the year 2000, the EEVC (European Enhanced Vehicle-Safety Committee) gave an advice on the subject of seat belt reminders. In 2002, EuroNCAP followed up this advice and began to 'reward' cars that had a built-in seat belt reminder which of course must meet certain requirements. The reward consisted of being awarded extra points which could result in an extra star in the final score (see also the SWOV Fact sheet [Euro NCAP, a safety instrument](#)). Initially, EuroNCAP focused on the vehicle occupant who forgets to put on the seat belt and not so much on those who refuse to wear a seat belt on principle. The latter would need a intrusive warning, but EuroNCAP did not want to have a negative effect on seat belt use by making warnings too aggressive or by making it impossible to drive off (as was the case with the American interlock system). Now EuroNCAP has adopted a stricter course.

In 2006, the European Commission, supported by the European Transport Safety Council (ETSC, 2006) included the seat belt reminder in its road safety programme. This way the European Commission hoped to realize part of its ambitious target for 2010; 50% fewer road deaths than in 2001. At present, legislation is being prepared that makes it compulsory for all new cars to be fitted with a seat belt reminder for driver seats. In 2008, this was already the case for 77% of all newly sold cars in Europe (ETSC, 2009).

For the car manufacturers, the latest version of the EuroNCAP protocol (May 2009) describes which features a seat belt reminder must have to qualify for extra points. According to this protocol the reminder does not need to warn when the car is used for parking manoeuvres at speeds lower than about 10 km/h. Furthermore, the protocol requires both a visual and an acoustic signal to be present to remind the occupants of wearing the seat belt. This must be done 60 seconds after the engine has been started, or otherwise when the vehicle exceeds a certain speed or distance. The acoustic signal must be sufficiently loud and clear, get louder after a while, and have duration of at least 90 seconds, possibly with brief pauses. To prevent unnecessary signals, the system must also be capable of detecting whether or not the front seat(s) are occupied. Of course this feature is not necessary for the driver seat. The new EuroNCAP protocol also awards an extra point for each other seat in the car that is equipped with a seat belt reminder (www.EuroNCAP.com).

What is the effect of the seat belt reminder?

An American observation study among Ford drivers (Williams et al., 2002) showed that significantly more seat belts were used in Fords with a seat belt reminder than in Fords without one; 76% and 71% respectively. A similar study among Honda drivers several years later (Ferguson et al., 2007) confirmed this situation: the observed use in Hondas with a seat belt reminder was larger than in those without one; 90% and 84% respectively.

Krafft et al. (2006) published the results of an observation study among Swedish drivers, irrespective of car brand. A total of more than 3,000 drivers in five different Swedish cities were observed. The study showed that seat belt use was 99% in cars with a rather intrusive version of the seat belt reminder (the system proposed by EuroNCAP that has an acoustic signal with increasing volume which continues for at least 90 seconds), 93% for a 'friendly middle' version (a system that uses a visual signal and a less penetrating acoustic signal) and 83% for cars without any seat belt reminder. Therefore, seat belt reminders with an intrusive (more aggressive) acoustic signal are more effective. This is confirmed by an American study (Freedman et al., 2009).

The European Commission supports the seat belt reminder because seat belt use in the Member States of the EU is by no means 100%. Although there are various EU countries, including the Netherlands, where seat belt use in front seats is already higher than 90%, the percentage sometimes is much lower in other countries. Seat belt use in rear seats is still rather low in most countries. In 2008, the Netherlands scored a reasonable 81% (DVS, 2008). Therefore, at the European level there is a lot to be gained if the non-wearers would also become seat belt users. ETSC (2007) has calculated that if the seat belt wearing percentage would be 99% in all European countries, there would be 2,400 fewer road deaths per year on European roads. In the Netherlands, a seat belt wearing percentage of 100% would save 10 fatalities (based on 2008 casualty data and wearing percentages; for the calculation method see Schoon, 1994)

Are seat belt reminders cost-effective?

In the past fifty years, the effectiveness of wearing seatbelts has been proved beyond the shadow of a doubt. Seat belt reminders being extremely effective and eventually preventing much physical injury has also become sufficiently clear. This raises the question of whether the benefits of the seat belt reminder offset the costs. Most studies come up with a (very) positive answer. Seat belt reminders require a relatively small investment and have great potential to reduce injury and the accompanying social costs.

An Australian study (Fildes et al., 2002) calculated that most seat belt reminders in each of three types (from simple to intelligent) are cost-effective; only the most elaborate system for all car seats was just below the limit with a cost-benefit ratio of 1:0.7. The researchers expressed the benefits in terms of reduced social costs due to reduced injury severity (*HARM reduction method*). They estimated the costs to be less than €50 for a simple seat belt reminder just for the driver seat to about €100 for an intelligent seat belt reminder for all seats.

The study by Fildes et al. (2002) and the information about the costs of the different types of seat belt reminders formed the basis of a Belgian cost-effectiveness study of seat belt reminders by Brabander & Vereeck (2003). They reported that the simplest and cheapest seat belt reminder is cost-effective if it results in 5% of the non-wearers going to use a seat belt. The most complicated and expensive version is cost-effective if 10-15% of the non-wearers become users. ETSC (2003) carried out a cost-benefit analysis for EU legislation for a compulsory acoustic seat belt reminder for car front seats. They assumed that 50% of all drivers and front passengers killed had not been wearing a seat belt and that an acoustic seat belt reminder can increase the percentage of seat belt use by front passengers to 97%. Twelve years after the introduction of the seat belt reminder, the costs are estimated to have increased to € 11 million, but the benefits to € 66 million. This gives a clearly positive cost-effectiveness ratio of 1:6.

What do car occupants themselves think of seat belt reminders?

In the US, car manufacturer Ford held a telephone survey to accompany the introduction of its own system (the *BeltMinder*) and particularly to measure how well the customer accepted it. The acceptance was good; from 75% by SUV and pick-up truck drivers to more than 90% by car drivers. Of drivers with a *BeltMinder*, 80% said that in the future they would buy a vehicle with a seat belt reminder (TRB, 2003).

The study of Ferguson et al. (2007) among Honda drivers also showed a positive attitude. Particularly 'part time' users said they now used a seat belt more often.

Especially focusing on young drivers, the Australian Monash University carried out a study into different types of warning systems. The young drivers were especially positive about the seat belt reminder and the Alcolock (see also SWOV Fact sheet [Alcolock](#)). On the other hand, systems such as a fatigue warning system, ISA (Intelligent Speed Assistance), and LDW (Lane Departure Warning) were judged a lot less positively (Young et al., 2004).

In Europe no recent data is available about seat belt reminder acceptance.

How many seat belt reminders are there in the Netherlands?

Because of the pressure that EuroNCAP has put on car manufacturers and the position of the European Commission, the number of seat belt reminders in new cars has increased rapidly during the last few years, also in the Netherlands. *Figure 1* shows the presence of seat belt reminders in Dutch new passenger cars sold between 1990 and 2005. Visual seat belt reminders (the 'warning light') there saw an increase since the mid 1990s; nearly 70% of the cars sold in 2005 had one. From the late 1990s onwards, the number of acoustic seat belt reminders has also increased rapidly; about 50% of the cars sold in the Netherlands in 2005 had one installed. Because of this rapid increase, it is to be expected that in 2010 all new cars in the Netherlands will have a seat belt reminder. The EU is expected to make them obligatory.

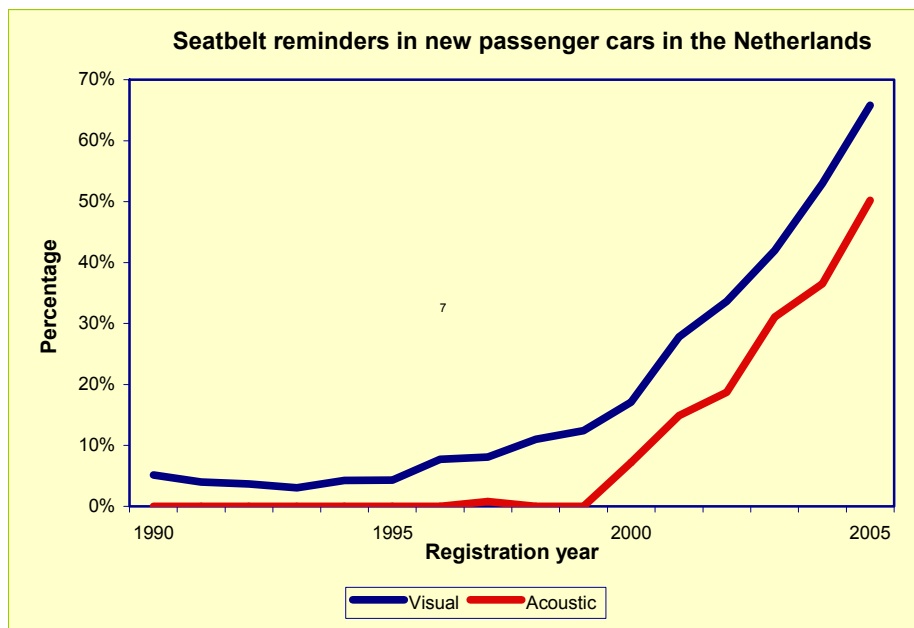


Figure 1.

Source: ECMD¹.

Occupants of delivery vans and lorries wear the seat belt considerably less frequently than occupants of passenger cars. A seat belt reminder for these vehicle categories will increase seat belt use. No literature was found about the acceptance of seat belt reminders by drivers and passengers of these vehicle types, nor about their presence.

All new coaches (non-public transport buses) are now fitted with passenger seat belts. Legislation makes wearing the seat belts compulsory. Seat belt wearing percentages are not known, but general experience tells us that few coach passengers wear a seat belt. Seat belt reminders in coaches only seem to be useful if passengers consider seat belts useful and necessary.

Conclusion

A seat belt reminder reminds car occupants to use their seat belts. This increases wearing percentages, which results in fewer casualties in traffic crashes. Seat belt reminders are becoming increasingly intelligent. Not only can they establish whether or not a seat is occupied, these days they also take the driving speed and the distance covered into account. The systems with a continuing and persistent acoustic signal are the most effective. It is to be expected that in 2010 all new cars are fitted with a seat belt reminder for the driver seat. Since 2002, EuroNCAP has awarded points for a seat belt reminder for the driver seat and since 2009 it has given an extra point for each additional seat that is fitted with a seat belt reminder.

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