



**Economic and Social
Council**

Distr.
GENERAL

TRANS/WP.29/GRSP/2004/22
24 September 2004

Original: ENGLISH
ENGLISH AND FRENCH ONLY

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

World Forum for Harmonization of Vehicle Regulations (WP.29)

Working Party on Passive Safety (GRSP)
(Thirty-sixth session, 7-10 December 2004,
agenda item B.1.2.)

STATUS OF SAFETY BELT REMINDER SYSTEMS RESEARCH
IN THE UNITED STATES OF AMERICA
AND
COMMENTS TO THE FRENCH PROPOSAL (GRSP-35-18) CONCERNING
SAFETY BELT REMINDERS

Transmitted by the expert from the United States of America

Note: This document is distributed to the Experts on Passive Safety only.

BACKGROUND

The use of a safety belt during a traffic crash is known to increase survivability and reduce the injury severity. In fact, although the majority of drivers use safety belts, persons not wearing belts are greatly overrepresented in traffic fatalities. Many approaches have been implemented to increase the rate of safety belt use, including state legislation, enforcement, and public service campaigns. Even with all of the interventions, safety belt use in the United States of America remains lower than that of other advanced countries. Some researchers have focused on determining the reasons for non- and part-time use. Several explanations have been identified, including:

- Comfort/convenience
- Forgetting
- Going a short distance
- Fatalism (i.e., if it is my time to go, then there is nothing I can do)
- Frequent entering and exiting the vehicle
- Only buckle up when necessary
- Laziness
- Not critical at slower speeds
- Familiarity with the drive
- Driver's choice/consequences
- Fear of entrapment.

With the goal of increasing safety belt use, automobile manufacturers, with encouragement from the National Highway Traffic Safety Administration (NHTSA), are designing and implementing advanced reminder systems to alert drivers that their belts are not being worn. Unlike the current reminders regulated in Federal Motor Vehicle Safety Standard (FMVSS) 208, Occupant Crash Protection, which are sensitive only to the driver and are only required to provide a 4- to 8-second alarm, the advanced systems provide reminders for a longer duration and can vary warnings with speed and/or other variables, such as elapsed time. In addition, the advanced systems may be sensitive to the other vehicle occupants, therefore potentially increasing safety belt use for all passengers.

RESEARCH

Although these systems may have great benefits, there have been few studies that measured their effectiveness and acceptability. Williams, Wells, and Farmer ^{1/} examined the effectiveness of a system developed by Ford Motor Company by observing people driving into car dealerships. Overall, they found that the vehicles with the belt reminder system did have a higher rate of safety belt use. However, their research was somewhat limited. For one, the test site was in a single state, resulting in a somewhat restricted sample. Second, assessment of driver reasons for non-use and methods of circumvention of the reminder were not determined. For example, did non-users leave the belts buckled behind them, did they permanently deactivate the system, and/or did they simply ignore the warning until it stopped? The study

^{1/} Williams, A.F.; Wells, J.K. and Farmer, C.M. 2002. Effectiveness of Ford's belt reminder system in increasing seat belt use. *Injury Prevention* 8:293-96.

also did not assess the extent to which the reminder system helped non-users versus part time users, i.e., did the reminder systems encourage part-time belt use by non-users or help part-time users to become full-time users? Such information might provide insights into design features that might enhance acceptability and effectiveness.

NHTSA recently completed a study requested by the Congress that would consider whether unobtrusive technologies could increase belt use. The request specifically states "newly developed vehicle technologies may present opportunities for increasing safety belt use, without being overly intrusive." They directed NHTSA, "to contract with the Transportation Research Board of the National Academy of Sciences (NAS) to conduct a study on the benefits and acceptability of these technologies, as well as any legislative or regulatory actions that may be necessary to enable installation of devices to encourage safety belt use in passenger vehicles". ^{2/} The contract established a peer review approach, with shared responsibilities between the NAS and NHTSA. As part of the study, NHTSA's Administrator sent two letters to all major automobile manufacturers in February 2002 and again in February of 2003, encouraging them to revisit the idea of technology being used to increase seat belt use and asking manufacturers the status of their plans to introduce this technology. ^{3/} Additional support to the NAS study was provided by NHTSA via focus groups and one-on-one in-depth interviews. ^{4/} The study was completed in 2004 "BUCKLING UP, Technologies to Increase Seat Belt Use," Special Report 278 (<http://www.nap.edu/catalog/10832.html>). The NAS committee concluded that safety belt reminder technologies show promise for increasing safety belt use and developed eight recommendations for the continued development of these technologies (see Appendix for the eight recommendations). NHTSA believes that the eight recommendations contained within the NAS report are consistent with efforts already under way and hopes that these efforts as well as the continued development of safety belt reminder systems will help increase safety belt use.

NHTSA is also about to begin a new research study to provide a comprehensive assessment of the effectiveness and acceptance of current safety belt reminder systems by non- and part-time users, which was one of the eight NAS recommendations. Included in this assessment is the need to determine the reasons why the reminder system failed its purpose. For example, to what extent did non- and part-time users ignore, permanently deactivate, or otherwise circumvent the reminder? In addition, this research effort is focused on identifying enhancements to increase the effectiveness of safety belt reminder systems without reducing acceptance. The study will also develop plans for investigating the potential of aftermarket reminder systems for use by high-risk groups and the effect of comfort and convenience of belt systems on increasing belt use. This study is to be completed by 2006. At that time, all results and conclusions will be available to the international community.

^{2/} Conference Report 107-308 to accompany Appropriations for the Department of Transportation and Related Agencies for fiscal year 2002, June 22, 2001.

^{3/} Responses from both letters have been placed in NHTSA docket number 2002-13226 (www.dms.dot.gov).

^{4/} Results of that study are also located in NHTSA docket number 2002-13226 (www.dms.dot.gov).

U.S. REGULATION - FMVSS 208, OCCUPANT CRASH PROTECTION

With respect to vehicle-based safety belt incentives, the Congress has provided NHTSA with specific direction. As part of the Motor Vehicle and School Bus Safety Amendments of 1974, Congress adopted a provision prohibiting NHTSA from requiring, or permitting as a compliance option, either ignition interlocks designed to prevent starting or operating a motor vehicle or buzzers that sounded for a period of more than 8 seconds after the ignition was turned to the "start" or "on" position (codified at 49 U.S.C. paragraph 30124).

This provision was the result of opposition from various members of Congress and from members of the public to the belt-induced interlocks and audible alerts that manufacturers were installing in their vehicles to meet the existing compliance options in FMVSS No. 208. Opposition was based on two factors: first, the low rate of belt use among the American public at that time, 10 to 14 per cent, meant that large portions of the population were subjected to either a 60 second audible warning or an ignition interlock; second, the available occupant detection technologies were insufficiently developed to determine reliably whether the two front outboard seating positions were occupied and the belt was being used by the occupant of a given seating position.

However, the legislative history indicates no intent on the part of Congress to prohibit manufacturers from voluntarily installing either interlocks or other belt system use-enhancement features.

S7.3 of FMVSS No. 208 requires an audible signal activate for a period of 4-8 seconds beginning when the vehicle ignition is turned on to indicate that the driver's safety belt is not fastened. NHTSA has stated that manufacturers may provide additional audible signals to indicate that a safety belt is not fastened so long as the additional signal is readily distinguished from the audible signal required under S7.3.

COMMENTS TO FRENCH PROPOSAL ON SAFETY BELT REMINDERS (GRSP-35-18)

The United States of America is in concurrence with France that safety belt reminder systems should be standardized, since consumer confusion could result if safety belt reminders varied significantly from vehicle to vehicle. At this time, it is considered that more research is necessary before a decision can be made to initiate rulemaking in the United States of America.

One of the prominent questions when considering safety belt reminder design is what characteristics of the reminder system (e.g., auditory, visual) enhance effectiveness while maintaining a proper level of acceptability. It is still yet to be determined which combination of sounds, symbols, and lights are most effective.

As stated in the "Principles" section, "the purpose of the system would be to define two levels of alert when the safety belt is not used." Research has not determined whether a multimodal approach is more effective, or that a two-stage approach is even required. NHTSA's safety belt reminder study, to be completed in 2006, is intended to address this lack of knowledge.

Concerning the second alert level, as described in the "Annex", it may be advisable to suggest the threshold instead of letting manufacturers select one, especially if one trigger is more accepted by consumers. In addition, it would be helpful to provide justification for the values selected so that manufacturers, if allowed to select, could make more informed decisions.

In the "Scope", it is discussed that the regulation will apply to the driver seating position, and if a reminder system is installed in any other position, the requirements for the driver position should apply. More research on reminder systems for seating positions other than the driver is suggested, since vehicle passengers may respond differently than drivers do to the reminders.

There is concern that some of the requirements listed in the "Annex" do not necessarily have the benefit of empirical research. For example, it is mentioned that the reminder should be activated for 30 seconds or longer. Some research indicated that the majority of people buckle up before the vehicle is in motion, which would be well under 30 seconds. This is not to say that the suggested duration is inappropriate, merely indicating that people who buckle up are doing so in a shorter time frame, and that research is needed in order to know how best to optimize reminder systems duration.

COMPATIBILITY WITH NHTSA FMVSS 208

The French proposal does not require an audible signal until the second alert level. The second alert level is triggered when any combination of the specified thresholds is met. As specified, it is possible for some of the combinations to occur within the first 8 seconds of a vehicles ignition being turned on (e.g. speed greater than a threshold speed below 25 km/h and duration greater than a threshold time below 60 seconds). Therefore, it is possible for an audible signal under the proposal, which must last longer than 30 seconds, to fail to comply with the limitations of FMVSS No. 208. However, so long as the proposal continues to provide manufacturers with a compliance option that permits the audible signal to activate after the 8-second period, a vehicle could comply with both FMVSS No. 208 and the proposed standard. (The same is true for Section 3.3 of the Japanese proposal, GRSG Informal Document No. 86-26.) This is based on the premise that the French proposal would not prohibit an audible signal during the first alert level, when FMVSS No. 208 requires an audible signal. To ensure that a vehicle could comply with both FMVSS No. 208 and the French proposal, the French proposal should provide for an audible signal option during the first alert level.

Appendix

Eight recommendations cited in Buckling Up: Technologies to Increase Seat Belt Use, Special Report 278, Transportation Research Board of the National Academies, 2004.

1. Congress should amend the statute regarding belt reminder systems by lifting the restrictions on systems with lights and chimes longer than 8 seconds, which would provide NHTSA with more flexibility and the authority to require effective belt reminder technologies. At this time, the committee does not see any compelling need to delete the prohibition on requiring interlock systems. However, this subject should be revisited in 5 years (see Recommendation 8).
2. Every new light-duty vehicle should have as standard equipment an enhanced belt reminder system for front-seat occupants with an audible warning and visual indicator that are not easily disconnected. Any auditory signal should be audible above other sounds in the vehicle. For the short term, manufacturers should be encouraged to provide these systems voluntarily so that field experience can be gained concerning the absolute and differential effectiveness and acceptability of a range of systems. Those who rate vehicles—NHTSA, the Insurance Institute for Highway Safety, Consumers Union—should be urged to note those vehicles that have belt reminder systems in their consumer safety rating publications.
3. NHTSA should encourage industry to develop and deploy enhanced belt reminder systems in an expeditious time frame, and NHTSA should monitor the deployment. As differences in effectiveness and acceptability of belt reminder systems are identified, manufacturers should install systems that are determined by empirical evidence to result in the greatest degree of effectiveness while remaining acceptable to the general public. Should voluntary efforts not produce sufficient results, NHTSA should mandate the most effective acceptable systems as determined by the current data. The agency should also conduct studies to identify factors that will increase the effectiveness and acceptability of the systems.
4. Rear-seat reminder systems should be developed at the earliest possible time as rear-seat sensors become available, to take advantage of the benefits of restrained rear occupants to the safety of both front and rear-seat occupants. Until that time, manufacturers should provide systems that notify the driver if rear-seat occupants either have not buckled up or have unbuckled their belts during a trip.
5. NHTSA and the private sector should strongly encourage research and development of seat belt interlock systems for specific applications. For example, the courts should consider requiring the use of interlocks for motorists with driving-under-the-influence-of-alcohol convictions or with high numbers of points on their driver's licenses. Interlocks could also be made available for other high-risk groups, such as teenage drivers. Insurance companies could lower premium rates for young drivers who install interlock systems. Finally, interlocks could be installed on company fleets.
6. Seat belt use technologies should be viewed as complementary to other proven strategies for increasing belt use, most particularly enactment of primary seat belt use laws that enable police to pull over and cite drivers who are not buckled up and well-publicized enforcement programs. Seat belt use technologies

have the potential to increase belt use, but their effect is largely confined to new vehicle purchasers, whereas seat belt use legislation affects all drivers.

7. Congress should provide NHTSA with funding of about US\$ 5 million annually ^{5/} to support a multiyear program of research on the effectiveness of different enhanced seat belt reminder systems. NHTSA should coordinate its efforts with other federal agencies, such as the Centers for Disease Control and Prevention, that are conducting related research. The research could involve undertaking more comprehensive studies of the effects of belt reminder systems on belt use; conducting controlled fleet studies of aggressive reminder systems; gathering more survey data on the effectiveness and acceptability of belt reminder systems from existing NHTSA and public health sources; and examining design issues, such as loudness of the chime, desirability of muting the radio when the chime is sounding, duration and cycling of the systems, and the presence and design of any cutoff capability. This research should help establish the scientific basis for regulation of belt reminder systems should regulation be needed.

8. In 2008 another independent review of seat belt use technologies should be conducted to evaluate progress and to consider possible revisions in strategies for achieving further gains in belt use, including elimination of the statutory restriction against NHTSA's requiring vehicle interlock systems.

^{5/} The committee developed the US\$5 million estimate for the cost of this research in consultation with NHTSA staff and consultants, who, together, have been involved in many similar efforts to estimate the effectiveness of various motor vehicle safety features. Although the figure is not intended to be precise, it should be about the right amount given the complexity of the proposed activities and NHTSA's extensive experience in conducting such evaluations.