



TRB SPECIAL REPORT 278

BUCKLING UP

Technologies to Increase Seat Belt Use

Using seat belts is one of the most effective strategies available to the driving public for avoiding death and injury in a crash. Today, however, nearly 35 years since the federal government required that all passenger cars be equipped with seat belts, approximately one-quarter of U.S. drivers and front-seat passengers are still observed not to be buckled up. Belt use rates in the United States lag well behind the 90 to 95 percent usage rates achieved in Canada, Australia, and several northern European countries.

Properly used, seat belts can reduce the risk of fatal injury for front-seat occupants by about 45 percent in cars and by 60 percent in light trucks driven as passenger vehicles. According to the National Highway Traffic Safety Administration (NHTSA), each percentage point increase in belt use should result in an estimated 250 lives saved per year.

STUDY CHARGE

Congress requested the present study to examine the potential benefits and public acceptability of technologies to boost seat belt use, such as reminder systems that exceed regulatory requirements. The request asked for recommendations concerning any legislative or regulatory actions necessary to enable installation of effective and acceptable new technologies in passenger vehicles.

PAST STRATEGIES

The requirement to install lap and shoulder belts in all new passenger vehicles was one of the original standards stemming from 1960s federal legislation to improve highway safety. But mere availability of belts was not enough to cause motorists to use them. Few motorists—perhaps only 10 to 15 percent—buckled up voluntarily. The then newly created NHTSA began promoting air bags, automatic belt systems, and 60-second flashing light and buzzer warnings to remind motorists to buckle up, but technical and political factors delayed introduction of air bags and automatic belts. As an interim measure, NHTSA mandated that all model year (MY) 1974 passenger vehicles be equipped with an ignition interlock that prevented the engine from starting if any front-seat occupant was not buckled up.

For a variety of reasons, including belt comfort, sensor accuracy, and public acceptance, the ignition interlock requirement met with strong opposition. Congress promptly enacted legislation prohibiting

NHTSA from requiring either ignition interlocks or continuous buzzer warnings of more than 8 seconds. NHTSA then implemented a sole requirement of a 4- to 8-second warning light and buzzer that is activated when front seat belts are not fastened at the time of ignition. This standard is still in effect today.

NHTSA's subsequent focus returned to restraint systems—primarily air bags that provide protection supplementing that provided by seat belts—which required no action on the part of the motorist. The agency also began strongly encouraging states to pass belt use laws. Such laws were rapidly introduced and have contributed to sharply increased belt use. Observed belt use rates are about 75 percent today. Over the past decade, however, the rate of belt use gains has slowed.

CURRENT NONUSERS

Many drivers and vehicle occupants report that they understand the safety benefits of belts but have not acquired the habit of buckling up on all trips. For such “part-time users,” roughly one-fifth of drivers, belt use is situational; they tend to buckle up when the weather is poor or when they are taking longer trips on high-speed roads where they perceive driving as riskier. The behavior of this group may be amenable to change through new reminder systems.

Hard-core nonusers are only about 4 percent of drivers, but this group has significantly more traffic violations, higher crash involvement rates, higher arrest rates, and higher alcohol consumption than those who buckle up all or part of the time. Sixty percent of drivers in severe crashes were reportedly not wearing seat belts. The risks this group of nonusers poses to themselves and others make it an important audience to reach, but reminder systems may not be influential.

TECHNOLOGY REVISITED

Current federal law restricts NHTSA's regulatory scope with regard to new seat belt use technologies, but manufacturers are not prevented from providing them voluntarily. Ford Motor Company introduced on selected MY 2000 vehicles the BeltMinder™, a system of warning chimes and flashing lights that operates intermittently for up to 5 minutes to alert and remind the unbelted driver to buckle up. Many other companies plan to deploy technologies that go beyond the current 4- to 8-second warning—so-called “enhanced” belt reminder systems. No

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manufacturers are currently developing interlock systems as original equipment, although technologies such as a seat belt shifter lock may soon be available as an aftermarket option in the United States.

Today's environment is far more conducive to the successful introduction of technologies for increasing seat belt use than was that of the early 1970s. Belt use is compulsory for adults in all but one state, belt use rates are significantly higher, belts are better designed, and sensing technologies are more sophisticated and reliable. Nevertheless, the pace and type of technology introduction continue to be affected by the interlock experience. Industry is understandably sensitive to consumer acceptance of what might be perceived as intrusive systems, and NHTSA's regulatory scope is quite limited.

FINDINGS

After consideration of the literature, in-depth interviews and focus groups conducted by NHTSA, and the briefings provided by industry and government officials, the committee concluded that new seat belt use technologies, in particular enhanced belt reminder systems, have the potential to increase belt use and be favorably received by most consumers. Part-time users, in particular, would apparently welcome a reminder to buckle up.

More aggressive systems, such as transmission interlocks, would probably be required to reach hard-core nonusers, but the in-depth interviews and focus groups conducted for this study imply that the acceptability of requiring interlocks is low. This suggests that their use be considered only for certain high-risk drivers.

The current legislation prohibiting NHTSA from requiring new seat belt use technologies is outdated and unnecessarily restrictive. Although industry is introducing some new systems on some models, NHTSA does not even have the legislative authority to establish minimum performance standards.

RECOMMENDATIONS

The committee's specific recommendations are only briefly summarized here; the reader is encouraged to study them closely (see information below to order the report or view it online). In general, the recommendations are designed to encourage and facilitate the increased use of effective new seat belt use technologies. Of most immediate importance, Congress should amend the current restrictive statute regarding belt reminder systems, which would provide NHTSA more flexibility and authority to require, if necessary, effective belt reminder technologies. New systems should be provided voluntarily by industry in the front seats of every new light-duty passenger vehicle, and these systems should have audible and visual indicators that are not easily disconnected. To ensure that the most effective systems are introduced, NHTSA should closely monitor and evaluate deployment. If industry does not move promptly, NHTSA should mandate the most effective systems, and another independent review should be conducted in 5 years to evaluate progress. The recommended strategy includes a specific program of behavioral research and field testing to ensure that, if NHTSA must regulate, it can do so on the basis of good science. Although the immediate emphasis is on front-seat reminder systems, aggressive development of effective rear-seat reminder systems should be pursued.

Seat belt use technologies should be viewed as complementary to other proven strategies for increasing belt use, in particular enactment of state 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 reminder systems may not be adequate for reaching hard-core nonusers. In the near term, NHTSA and the private sector should strongly encourage research and development of seat belt interlock systems for specific applications. For example, the courts could require the use of interlocks for motorists convicted of driving impaired, parents could install interlocks on vehicles driven by teenagers, insurance

companies could lower premium rates for young drivers of vehicles with interlock systems, and fleet owners could install interlocks. If these efforts and the introduction of enhanced belt reminder systems fail to adequately reach high-risk drivers, the issue of requiring interlocks should be revisited in a few years.

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