

Advanced Automotive Headlight Systems

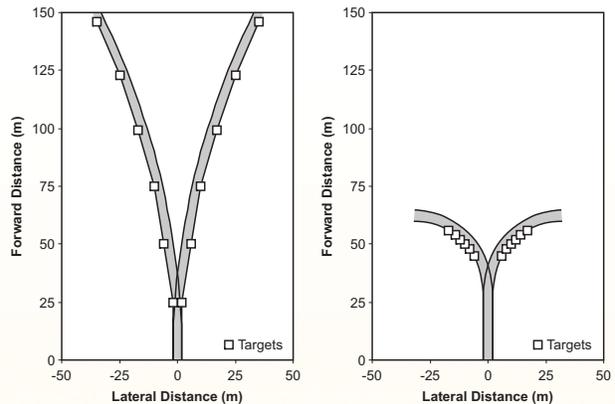
Researchers at the LRC are evaluating the potential for new lighting technologies and approaches to improve driving safety at night, including advanced automotive headlight systems. Visibility analyses from LRC field studies using swiveling or bending headlight systems in comparison with conventional, stationary low-beam headlights led to estimates of reduced nighttime crash frequencies of almost 4% along low-speed, sharp roadway curves and between 1% and 2% along higher-speed, shallower curves.

The LRC also looked at the potential safety benefits of adaptive or glare-free high beam headlight systems, which are beginning to appear on international vehicle models. These systems



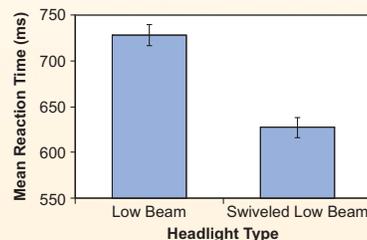
Swiveling headlamps like these can aim their beam $\pm 15^\circ$ to left or right of the center position.

allow drivers to use high beam headlights while selectively dimming a portion of the beam when oncoming drivers are present, preventing glare to the oncoming drivers and providing improved visibility along the rest of the road. The LRC's analyses suggest that nighttime crashes might be reduced by nearly 7% when adaptive high beams are used, relative to using low beam headlights.



Participants in the LRC's study responded to targets located along the outside edge of high-speed (left) and low-speed (right) curves.

The basis for both studies was the relative visual performance (RVP) model. LRC studies have previously demonstrated that the safety benefits from roadway intersection lighting were in line with visibility improvements evaluated using the RVP model for different types of intersections. Since visual performance for nighttime driving situations can be predicted accurately, and nighttime crash data are difficult to collect, RVP could serve as a practical surrogate for crashes, allowing efficient identification of new lighting systems for maximizing driving safety at night.



Average response times to targets (\pm s.e.m.) along the low-speed curve were shorter under the swiveled headlight system than under conventional low beam headlights.

Sponsor

Transportation Lighting Alliance (Audi, Automotive Lighting, Hella, OSRAM SYLVANIA, Philips and Varroc)



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