Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTRI-2002-25		

4. Title and Subtitle	5. Report Date
Hydrophobic Treatment of Glass Headlamp Lenses and the Effect on Light Output	November 2002
	6. Performing Organization Code 302753
7. Author(s) James R. Sayer, Mary Lynn Mefford, and Yoshihiro Nakata	8. Performing Organization Report No. UMTRI-2002-25
9. Performing Organization Name and Address The University of Michigan Transportation Research Institute 2901 Baxter Road Ann Arbor, Michigan 48109-2150 U.S.A.	10. Work Unit no. (TRAIS) 11. Contract or Grant No.
12. Sponsoring Agency Name and Address The University of Michigan Industry Affiliation Program for Human Factors in Transportation Safety	13. Type of Report and Period Covered 14. Sponsoring Agency Code

15. Supplementary Notes

The Affiliation Program currently includes: AGC America, Autoliv, Automotive Lighting, Avery Dennison, BMW, DaimlerChrysler, DBM Reflex, Denso, Exatec, Federal-Mogul, Fiat, Ford, GE, Gentex, General Motors, Guardian Industries, Guide Corporation, Hella, Honda, Ichikoh Industries, Koito Manufacturing, Labsphere division of X-Rite, Lang-Mekra North America, LumiLeds, Magna International, Mitsubushi Motors, Nichia America, North American Lighting, OSRAM Sylvania, Pennzoil-Quaker State, Philips Lighting, PPG Industries, Reflexite, Renault, Schefenacker International, Solutia Performance Films, Stanley Electric, Toyota Technical Center U.S.A., Valeo, Vidrio Plano, Visteon, 3M Personal Safety Products, and 3M Traffic Control Materials. Information about the Affiliation Program is available at http://www.umich.edu/~industry/

16. Abstract

This study examined the effect that hydrophobic treatment of glass headlamp lenses has on light output when headlamps are exposed to contaminants under naturalistic driving conditions. The hypothesis, *a priori*, was that the water-repelling nature of a glass surface after hydrophobic treatment would aid in minimizing the adhesion, or promote the removal, of contaminants on the lens, thereby leaving light output less affected.

Additional variables of interest included the presence of precipitation, the side of the vehicle the headlamp was on, and whether the headlamp was illuminated during the exposure. The study examined vehicles with glass lenses installed as intended by the vehicle manufacturer. The vehicles were driven on a 155-km route under conditions of active precipitation or no precipitation, and with or without the headlamps on. Subsequent to each drive, measurements of light output were made at eight key test points in the headlamp beam pattern. The headlamps were then cleaned and measured again. In this way, each headlamp served as its own control.

The results indicate that hydrophobic treatment of glass headlamp lenses did not affect light output. However, the presence of precipitation did result in decreased light output below the horizontal cutoff of the beam pattern and increased light output above the horizontal cutoff. This result was especially evident above the horizontal cutoff when the headlamps had been illuminated. The side of the vehicle the headlamp was on did not affect light output.

17. Key Words	18. Distribution Statement
beam pattern, dirt, glare, headlamp, hydrophobic, rain	Unlimited

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. of Pages	22. Price
None	None	17	